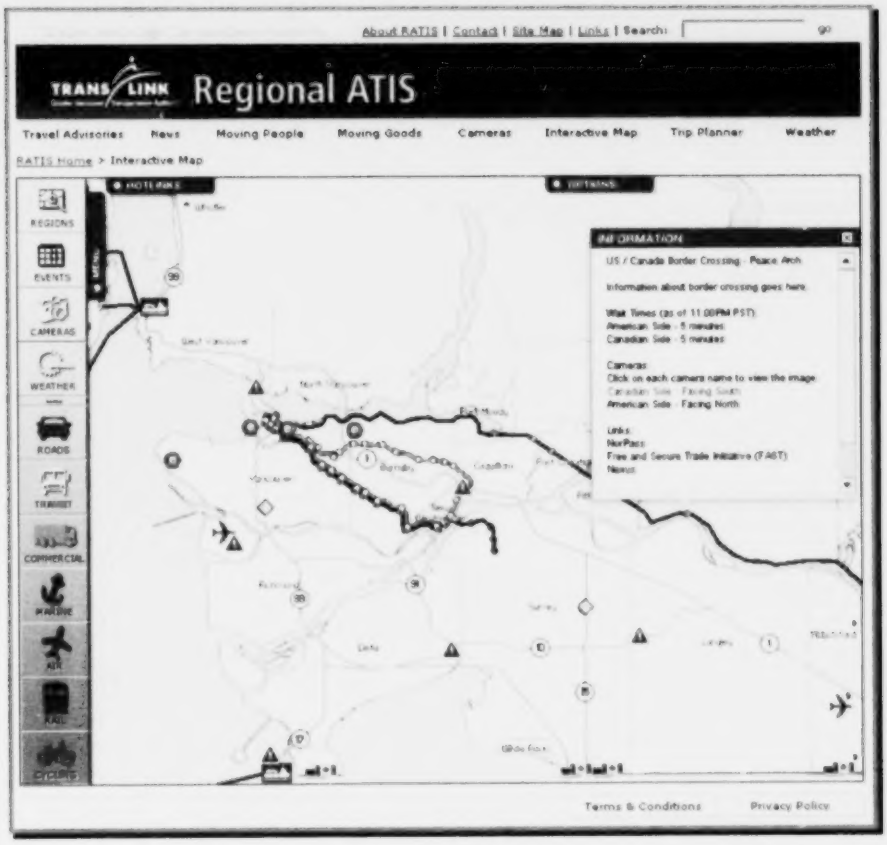
TP 14682E

Regional Advanced Traveller Information System



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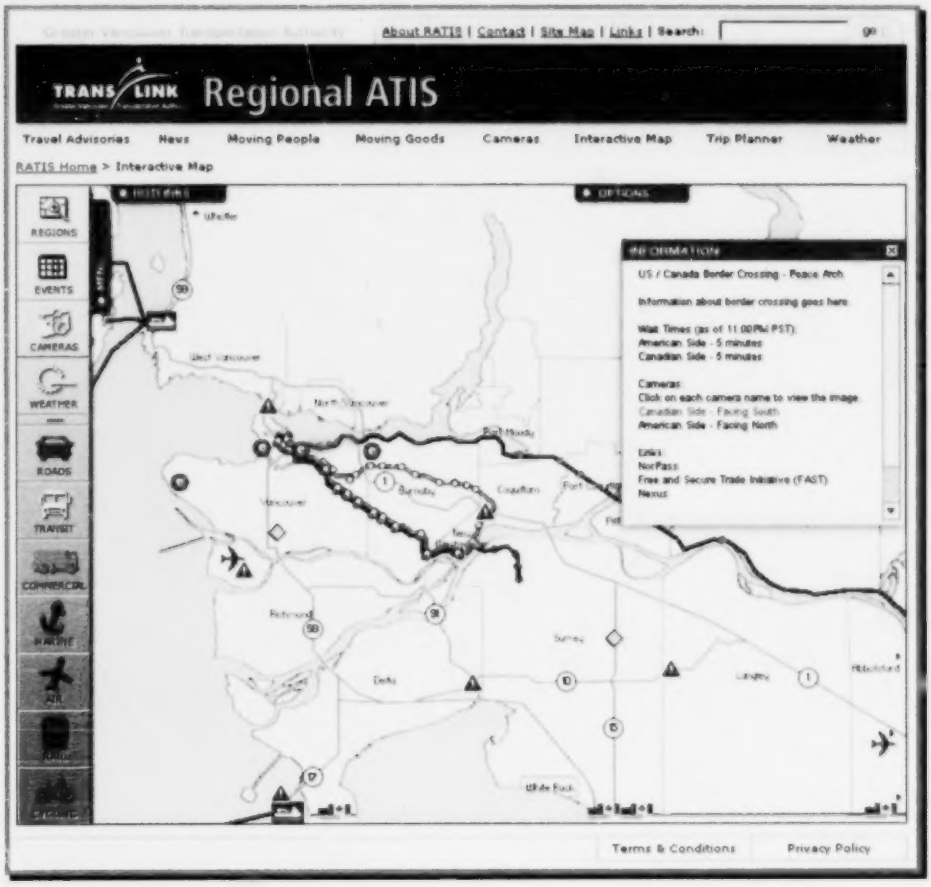

by
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April 2005

This report reflects the views of the authors and not necessarily those of the Transportation Development Centre of Transport Canada.

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16. Abstract

This document summarizes the work done in developing a concept of operations for a regional Advanced Traveller Information System (ATIS) for Greater Vancouver. The objective was to design a one-stop portal that provides multi-modal, multi-jurisdiction, real-time and static traveller information through the World Wide Web and other means of dissemination. The concept of operations for the regional ATIS was developed by identifying existing and future prospective information resources from member agencies (as well as other stakeholders) and integrating them to define a unified traveller service within the region. The design, which took into consideration institutional issues, technology, operation, and maintenance, also includes the definition and outline of the ATIS service. In addition to providing a functional concept, the ATIS design offers a cost effective and constructible solution for project execution and for system implementation at present, as well as a feasible integration path for future project phases that will come on line as new components are implemented. The design is in accordance with the *ITS Architecture for Canada* and incorporates the latest evolving ITS standards for data exchange to support integration with other ITS centres publishing traveller information. The web portal architecture is designed to adhere to the guidelines developed for presentation of ITS information and web accessibility.

The first phase implementation demonstrates the feasibility of the ATIS design and provides an opportunity for other jurisdictions to learn about the regional application of advanced traveller information.

**The system was re-branded as iMove in 2006.*

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16. Résumé

Ce document résume les travaux réalisés en marge du développement d'un concept d'exploitation pour un Système perfectionné de renseignements aux voyageurs (ATIS, *Advanced Traveller Information System*) dans la région métropolitaine de Vancouver. L'objectif était de concevoir un portail central qui fournit aux voyageurs une information statique et des renseignements en temps réel concernant plusieurs modes de transport, sur le territoire de plusieurs municipalités, au moyen du Web et d'autres moyens de diffusion. Pour développer le concept d'exploitation de l'ATIS régional, l'équipe de recherche a inventorié les sources d'information existantes et futures des organismes participants (et celles d'autres intervenants) et les a intégrées pour créer un service unifié aux voyageurs, de portée régionale. La conception, qui a pris en compte les enjeux institutionnels, la technologie, l'exploitation et la maintenance, comprend aussi la définition et la description du service ATIS. Outre un concept fonctionnel, l'ATIS résultant offre une solution économique et constructible pour la réalisation du projet et la mise en œuvre immédiate du système, de même qu'une voie d'intégration réaliste pour les phases subséquentes de mise en œuvre de nouvelles composantes du système. Le projet d'ATIS est conforme à l'*Architecture des STI pour le Canada* de même qu'aux dernières normes STI en matière d'échange de données, ce qui permettra l'intégration avec d'autres centres STI de renseignements aux voyageurs. L'architecture du portail Web est conforme aux lignes directrices relatives à la présentation d'information STI et à l'accessibilité du Web.

La mise en œuvre de la première phase démontre la faisabilité de l'ATIS et elle constitue pour les autres administrations une occasion d'en savoir plus sur l'application régionale d'un système perfectionné de renseignements aux voyageurs.

**Le système a été renommé iMove en 2006*

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EXECUTIVE SUMMARY

The long-term objective of the regional Advanced Traveller Information System (ATIS)* initiative is to provide comprehensive, accurate, and timely traveller information to the public and other key user groups throughout Greater Vancouver, using a range of dissemination media. The intent is to enable users to make better and more informed travel decisions.

The first phase of the initiative developed a concept of operations for a multi-modal, multi-jurisdictional static and real-time ATIS, demonstrated its feasibility using a prototype, and created a state-of-the-art Web portal that can serve as a model for other jurisdictions. This report covers the research, development, and design work up to the completion of the design specifications.

The first task of this project was to identify the available existing and planned databases containing transportation information within the Greater Vancouver Region that could potentially be used as sources of information for the regional ATIS.

A survey was developed to:

- Identify what transportation information is in the databases, where is it located and how best to obtain it
- Determine the timeliness of the data
- Identify the feasibility of obtaining the data in real-time

The survey was sent to a list of the relevant transportation stakeholder agencies and companies in the Greater Vancouver region and adjacent jurisdictions. The survey found:

- Traveller information is currently available from many agency web sites
- Traffic data and CCTV images from the major tunnels and bridges are not available and would require upgrades to the Ministry's traffic management systems
- Real-time incident information could be obtained from E-COMM CAD system
- Road closures and condition information from the Greater Vancouver municipalities are not generally available and most municipalities would require a new system to collect and disseminate the information

Development of a regional ATIS requires a partnership among public and private sector agencies that takes into account daily operations of the partners and the need to collect traveller information as quickly and efficiently as possible without unduly affecting policies, procedures, and staffing requirements of the partners. An appropriate institutional framework for the sustained operation, maintenance and enhancement of the ATIS needed to be defined. The project team reviewed recent ATIS deployments in North America, identified the key institutional and financial issues for consideration and recommended an institutional framework for the Regional ATIS.

Institutional issues considered were:

- Hosting a standalone system operating on 24-hour-day, 7-day-week basis
- Basic and value-added services and their pricing
- Ownership of data and intellectual property

After examining ATIS deployments in the US, which were not sustainable even on a cost-recovery basis due to lack of revenue, it was concluded that public sector funding would be necessary in the near term. However, a market could develop for this service over the next three to five years where revenue comes from advertising, subscriptions, and sponsorships. A public agency framework was recommended for the initial start-up, with the public sector taking the lead in data collection, data fusion, packaging and database management, and the private sector providing value-added and customized services.

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* *The system was re-branded as iMove in 2006.*

The design, which took into consideration institutional issues, technology, operation, and maintenance, offers a cost effective and constructible solution for system implementation at present, as well as a feasible integration path for future phases as new components are implemented.

The cornerstone of the web portal is a feature-rich interactive map that allows the user to view current incident and congestion information in graphical form, with toggle switches to include or exclude road, rail, marine and air travel networks. Users can locate and view images from traffic and border cameras. Incident and event information, transit and border delay information, and news are available from both the web portal home page and from a more detailed information page that allows users access to descriptions of situations they may need to take into consideration when planning their trip.

The design is in accordance with the *ITS Architecture for Canada* and incorporates the latest evolving ITS standards for data exchange to support integration with other ITS centres publishing traveller information. The web portal architecture adheres to the guidelines developed for presentation of ITS information and web accessibility.

SOMMAIRE

L'objectif à long terme du projet de Système perfectionné de renseignements aux voyageurs (ATIS, *Advanced Traveller Information System*)* de portée régionale est d'offrir au public et aux autres groupes d'utilisateurs clés de la région métropolitaine de Vancouver une information complète et à jour, au moyen d'un éventail de médias. Le but est de permettre aux utilisateurs de prendre des décisions plus éclairées concernant leurs déplacements.

La première phase du projet a consisté à élaborer un concept d'exploitation pour un système ATIS multi-modal et multi-juridictionnel contenant une information statique et des données en temps réel, a démontré la faisabilité de ce concept en utilisant un prototype, et a créé un portail Web d'avant-garde qui pourra servir de modèle ailleurs. Le présent rapport englobe les travaux de recherche, de développement et de conception, jusqu'à l'établissement des spécifications du système.

La première tâche de ce projet a consisté à inventorier les bases de données, existantes et prévues, qui contenaient de l'information sur les transports dans la région métropolitaine de Vancouver, et qui pouvaient servir de sources d'information pour l'ATIS régional.

Un sondage a été élaboré afin de :

- déterminer quelle information sur les transports est contenue dans les bases de données, où se trouve cette information, et le meilleur moyen de l'obtenir;
- déterminer l'actualité des données;
- déterminer la possibilité d'obtenir les données en temps réel.

Le sondage a été envoyé aux organismes et sociétés de transport concernés de la région métropolitaine de Vancouver et des municipalités adjacentes. Il a donné les résultats suivants :

- des renseignements aux voyageurs sont présentement offerts sur les sites Web de nombreux organismes;
- les données sur la circulation et les images de télévision en circuit fermé des principaux tunnels et ponts ne sont pas présentement accessibles, et leur diffusion nécessiterait des améliorations aux systèmes de gestion de la circulation du Ministère;
- l'information en temps réel sur les incidents pourrait être relayée par le système CAD (prise et acheminement des appels) du centre E-COMM (communications d'urgence);
- l'information sur les fermetures de routes et l'état des routes n'est généralement pas rendue disponible par les municipalités de la région métropolitaine de Vancouver, et la plupart de celles-ci auraient besoin d'un nouveau système pour recueillir et diffuser cette information.

Le développement de l'ATIS régional nécessite un partenariat entre les organismes du secteur public et du secteur privé. Un tel partenariat doit tenir compte des opérations quotidiennes des partenaires et de la nécessité de recueillir les renseignements aussi rapidement et efficacement que possible, sans avoir d'effet indu sur les politiques, les procédures et les besoins en personnel des partenaires. Un cadre institutionnel pour l'exploitation, l'entretien et le perfectionnement de l'ATIS régional devait être défini. L'équipe de projet a donc passé en revue les déploiements récents d'ATIS en Amérique du Nord, a cerné les grands enjeux institutionnels et financiers à prendre en compte, et a recommandé un cadre institutionnel pour l'ATIS régional.

Les enjeux institutionnels pris en compte sont les suivants :

- hébergement d'un système autonome fonctionnant 24 heures sur 24, 7 jours par semaine;

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* *Le système a été renommé iMove en 2006.*

- services de base et services à valeur ajoutée, et établissement des prix de ces services;
- propriété des données et de la propriété intellectuelle.

Ayant constaté qu'aux États-Unis, les déploiements de systèmes ATIS n'étaient pas rentables, même en régime de recouvrement des coûts, pour cause de revenus insuffisants, l'équipe de projet a conclu qu'un financement du secteur public serait nécessaire au début. Toutefois, d'ici trois à cinq ans, un marché pourrait se développer pour ce service, qui générerait des revenus de publicité, d'abonnements et de commandites. Il a été recommandé qu'au début, le système soit encadré par un organisme public, qui s'occuperait de la collecte, de la fusion et du conditionnement des données et de la gestion de la base de données, le secteur privé offrant des services personnalisés et à valeur ajoutée.

Le concept, qui prend en considération les enjeux institutionnels, la technologie, l'exploitation et la maintenance, offre une solution économique et constructible pour la mise en œuvre, des à présent, d'un système, de même qu'une voie d'intégration réaliste de phases futures, pour l'ajout de composantes.

La pierre angulaire du portail Web est une carte interactive comportant une foule de détails, qui permet à l'utilisateur de visualiser sous forme graphique une information à jour sur les incidents et la congestion routière, et d'actionner des interrupteurs à bascule pour inclure ou exclure les réseaux de transport routier, ferroviaire, maritime et aérien. Les utilisateurs peuvent visualiser les images de caméras de surveillance de la circulation et de postes frontaliers. Pour obtenir des renseignements sur les incidents et les événements, sur les retards dans les transports en commun et sur les temps d'attente aux postes frontaliers, et lire les nouvelles, on peut consulter à la fois la page d'accueil du portail Web et une page plus détaillée, où il est possible d'obtenir la description de situations particulièrement pertinentes pour la planification d'un déplacement.

La conception est conforme à l'*Architecture des STI pour le Canada* de même qu'aux dernières normes STI en matière d'échange de données, ce qui permettra d'intégrer l'ATIS à d'autres centres STI de diffusion de renseignements aux voyageurs. L'architecture du portail Web est conforme aux lignes directrices relatives à la présentation d'information STI et à l'accessibilité Web.

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GLOSSARY

ATIS	Advanced Traveller Information System
ATMS	Advanced Traffic Management System
C2C	Center to Center
CCTV	Closed Circuit Television
CMS	Content Management System
DEN	Data Exchange Network
CVO	Commercial Vehicle Operation
FTP	File Transfer Protocol
HTTP	HyperText Transfer Protocol
HTTPS	Secure HyperText Transfer Protocol
IDL	Interface Definition Language
IM	Incident Management
IP	Internet Protocol
ISPs	Information Service Providers
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
IVR	Interactive Voice Recognition
NTCIP	National Transportation Communication for ITS Protocol
SAE	Society of Automotive Engineers
SMTP	Simple Mail Transfer Protocol
SOAP	Simple Object Access Protocol
TCP/IP	Transmission Control Protocol and the Internet Protocol
TMDD	Transportation Management Data Dictionary
UDDI	Universal Description Discovery and Integration
UDP	User Datagram Protocol
W3C	World Wide Web Consortium
WAP	Wireless Application Protocol
WSDL	Web Services Description Language
WML	Wireless Markup Language
XML	Extensible Markup Language

1 INTRODUCTION

1.1 Project Background

The ITS Corporation ("592040 BC Ltd.") of British Columbia was established on December 3, 1999, as a subsidiary of the Greater Vancouver Transportation Authority ("TransLink"), to define an ITS program and guide the development and implementation of ITS projects in the region and province. The ITS Corporation prepared and published the Provincial ITS Vision and Strategic Plan in November 2001.

As part of the effort to examine areas of interest to determine the "next step" for joint projects in the ITS Strategic Plan, the ITS Corporation began the development of a concept of operations for a regional Advanced Traveller Information System (ATIS) for Greater Vancouver.

1.2 Project Overview

The objective of the regional ATIS initiative within Greater Vancouver is to provide traveller information to the travelling public and other key user groups, when and where required, by deploying multiple information delivery mechanisms. The regional ATIS initiative will enable the user to make better and informed travel decisions. The information will be in the appropriate format, and with the appropriate content and timing to effectively support travel decisions, such as choice of mode, choice of route, and timing of the journey. The system will also deliver sufficient information to enable hybrid or multi-mode trip options. The information is to be made available at each stage of the trip namely, prior to departure (pre-trip), at departure and during the course of the journey, in a wide variety of customizable formats, including voice-synthesized information bulletins, short messages and sophisticated map-based displays.

In summary, the goal of this project is to design a regional ATIS for Greater Vancouver that provides:

- Pre-trip and en-route information that is accurate, timely and reliable;
- Adequate geographical coverage;
- Personalized access & decision guidance;
- Convenient access and speed; and
- Low cost of use (free to the public).

The concept of operations of the Regional ATIS is to provide the users a "one-stop" public web portal that will provide multi-modal, multi-jurisdiction, static and real-time traveller information for Greater Vancouver via various methods of dissemination.

The Regional ATIS will be implemented over three distinct phases as follows:

- Phase 1 – Integration of existing information sources and any other feasible sources that come online during the deployment period and dissemination via a public web portal;
- Phase 2 – Addition of other sources of data as they come online or new information sources as generated by new deployments pursued independently by the member agencies; addition of mode-choice planning tools and support for additional dissemination technologies, such as phone, personal digital assistants (PDA), e-mail and kiosks.
- Phase 3 – ATIS initiatives requiring larger capital investments such as predictive systems; and/or, systems that require a high degree of data fusion from multiple sources and agencies.

This design project developed a concept of operations for the regional ATIS based on using existing and future prospective information resources from member agencies (as well as other stakeholders) and integrating them to provide a unified traveller service within the Region. The design, which has taken into consideration institutional issues, technology, operation, and maintenance, also includes the definition and outline of the Regional ATIS service. In addition to providing a functional concept, the ATIS design offers a cost effective and constructible solution for project execution and for system implementation at present, as well as a feasible integration path for future project phases that will come on line as new components are implemented. The design is also in accordance with the ITS Architecture of Canada and incorporates the latest evolving ITE and NTCIP standards for data exchange to support integration with ITS centres publishing traveller information. The web portal architecture was developed in adherence to guidelines developed for presentation of ITS information developed by ENTERPRISE[1] and web accessibility from World Wide Web Consortium (W3C). These were demonstrated by a web portal prototype created to provide a visual context to the design specifications.

The results of this project were the development of design specifications for the deployment of the Regional ATIS and public web portal plus tender specifications for improvements to the BC Ministry of Transportation's existing traffic management facilities at the bridges and tunnels to publish traffic information and camera images in XML format for transmission to the ATIS system.

The public web portal for the Regional ATIS will present a single, comprehensive source of information to travellers within the Greater Vancouver region, see Figure 1.1 for a prototype of the home page public web portal. From this single source, travellers and commercial vehicle operators will have access to all of the information in a simple, intuitive format. The dissemination mechanism will meet the needs of the travellers (or persons) with disabilities, with use of accessible technology such as voice activated text, etc. The portal will combine information that is retrieved from stakeholders through a common look and feel with information available from established web sites and portals to ensure the user does not have to use more than one source for all their travelling information needs.

[1] ENTERPRISE – A multi-national program dedicated to the advancement of ITS. Current participants include states from across the US, as well as Canadian and European agencies.

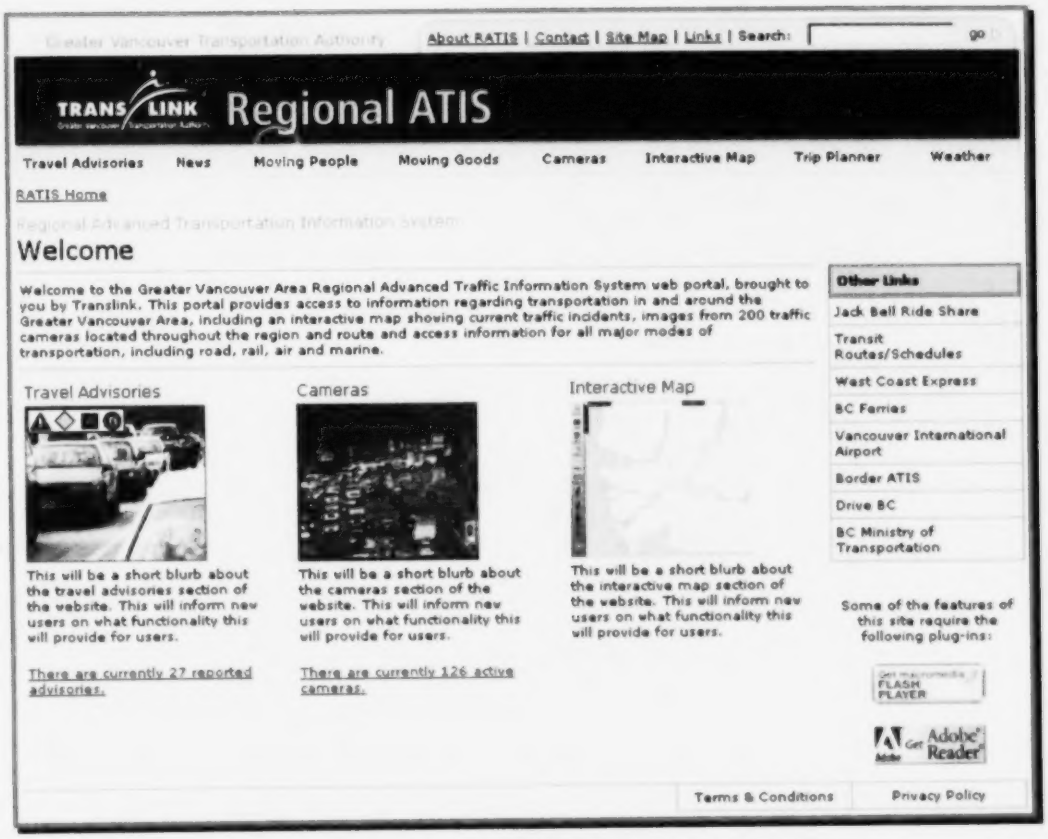
About RATIS | Contact | Site Map | Links | Search:
go
TRANS LINK
Regional ATIS
Travel Advisories
News
Moving People
Moving Goods
Cameras
Interactive Map
Trip Planner
Weather
RATIS Home
Welcome
Welcome to the Greater Vancouver Area Regional Advanced Traffic Information System web portal, brought to you by Translink. This portal provides access to information regarding transportation in and around the Greater Vancouver Area, including an interactive map showing current traffic incidents, images from 200 traffic cameras located throughout the region and route and access information for all major modes of transportation, including road, rail, air and marine.
Travel Advisories
This will be a short blurb about the travel advisories section of the website. This will inform new users on what functionality this will provide for users.
There are currently 27 reported advisories.
Cameras
This will be a short blurb about the cameras section of the website. This will inform new users on what functionality this will provide for users.
There are currently 126 active cameras.
Interactive Map
This will be a short blurb about the interactive map section of the website. This will inform new users on what functionality this will provide for users.
Other Links
Jack Bell Ride Share
Transit Routes/Schedules
West Coast Express
BC Ferries
Vancouver International Airport
Border ATIS
Drive BC
BC Ministry of Transportation
Some of the features of this site require the following plug-ins:
FLASH PLAYER
Get Adobe Reader
Terms & Conditions
Privacy Policy

Figure 1-1: Regional ATIS Web Portal – Home Page

The cornerstone of the portal will be a feature-rich interactive map that will present numerous layers of information to the traveller, see the Figure on the cover page of this report for a prototype of the interactive map. It will allow the user to see current incident and congestion information in a graphical form and further, allow the use of toggle switches to include the road, rail, marine and air travel networks at the same time. Travellers will also have the ability to view the locations of all traffic and border cameras situated on the same map if they choose. The interactivity of the map will enable the user to customize the view to meet their travelling needs. Finally, the map will be designed to allow the user to zoom into a specific region, and then pan the view of the map across the region, allowing even greater control over what the traveller sees.

Incident and event information, transit and border delay information and transportation-related news will be available from both the portal home page and from a more detailed information page which will allow the traveller to access descriptions of events that they may need to take into consideration when planning their trip. This information will be presented in a news format and will include a filter to make it easy for the reader to exclude information that is not pertinent to the traveller.

Additional content areas include:

- Motorist-specific information
- Traffic cameras
- Public transit information including buses, rail, and marine
- Commercial transit information including buses, rail, marine and air

- Commercial vehicle operator-related information
- Cycling information
- Current weather and forecasts
- Information for travellers (or persons) with disabilities
- Tourist resources

1.3 Scope of Document

This document summarizes the detailed findings and recommendations of the project and is organized based on its major tasks, namely:

- Technical System Inventory
- Sustainability and Governance
- Functional Design
- System Design

The results of these tasks were documented in working papers that are included as appendices to this report.

2 TECHNICAL SYSTEM INVENTORY

The first task in this project was to identify the available existing and planned databases containing transportation information within the Greater Vancouver Region that could potentially be used as sources of information for the Regional ATIS. The Technical System Inventory working paper is attached as an appendix to this report.

2.1 Survey Method

A survey was developed whose primary purpose was to:

- Identify what transportation information is available, where is it located and how best to obtain it;
- Determine the timeliness of the data;
- Identify current/planned information databases; and
- Identify the feasibility of obtaining the data in real-time.

First, the ATIS Subcommittee and the project team developed a list of the relevant transportation stakeholder agencies and companies in the Greater Vancouver region and adjacent jurisdictions and their appropriate contacts. A survey response form and covering letter was sent to the contacts to solicit available traveller information data, data formats and input methods, and public distribution formats and methods.

Approximately 50% of the agencies/departments surveyed responded using the survey form. After follow-up phone calls and reminders, some non-responsive agencies and firms explained that they felt they had nothing to contribute to the ATIS project. The information collected through the survey was collated into a database and summarized into data sources by category and by agency. This database of transportation information was then used as an input to the evaluation of ATIS user services in the subsequent functional design task.

2.2 Survey Results

Compared to other major metropolitan areas in North American, the region does not have real-time congestion information available for the vast majority of major highway and road corridors. The Ministry of Transportation has several traffic control centres, located at the major tunnels and bridges, that are the only sources of congestion data currently available. The existing transportation management systems at these Ministry centres do not currently provide information to external agencies or to the public-at-large, and therefore it was determined that infrastructure upgrades would be required in order to obtain the information from these systems.

The Ministry also operates DriveBC which is a comprehensive and integrated (province-wide) web-based system to collect at source, and automatically process and disseminate, a variety of road and driving conditions, incident data in conjunction with driving related weather data.

The municipalities within the region, that responded to the survey, all track major construction projects. Most manually post basic project descriptions on their web sites. For example, Coquitlam uses a maintenance management system to track the construction and closures in their jurisdiction and manually posts the major project descriptions to their web site. The level of detail of the project descriptions varies significantly and there is no consistency in the location details or impact to traffic among the municipalities.

E-COMM (Emergency Communications for Southwest British Columbia) is responsible for the 911 call service for the entire region and for the dispatch of emergency services for the Vancouver Police and Fire Departments and several RCMP detachments in the region. As such,

they record incidents, which are dispatched to the emergency services responders, in an computer aided dispatch (CAD) system. The traffic incident-related information in this system could be provided to the Regional ATIS as verified incidents. In a number of other North American jurisdictions (i.e. Los Angeles, Tampa and Chicago), incident data from 911 computer dispatch systems have been successfully integrated into regional transportation management and traveller information systems, so that notification of confirmed traffic accidents and other incidents reported by the police are automatically provided to the traffic agency and regional ATIS.

The Greater Vancouver Transportation Authority ("TransLink") provides a trip planner, bus schedules, fares and route maps of their operating subsidiaries (Coast Mountain Bus, Skytrain, West Coast Express and Fraser River Marine which operates the Albion Ferry) and the West Vancouver "Blue Bus" service on their web site. The trip planner tool provides the public with the ability to plan a trip using any of the transit services offered by TransLink. In addition, Translink publishes a printed map of the cycling paths and routes. This map is currently available only in printed format.

The operators of the airport shuttle services and the inter-regional bus services such as Pacific Coach, Airporter, Greyhound and Perimeter, all provide schedules, routes and fare information on their own web sites.

The Vancouver International Airport Authority (YVR) use their web site to provide public information on the operation of the Vancouver International Airport, including modes of access to the airport, flight schedules, real time flight information and parking information. In addition, some of the local air service providers including Harbour Air Seaplanes, West Coast Air, and Helijet International also provide fight schedules & fare information on their own web sites.

The BC Ferries Corporation provides real time information on the current conditions at the ferry departure terminals, an online reservation planner and schedules, fares and route information on their web site. Other ferry service providers (Harbour Lynx, False Creek Ferries and Aqua Bus) all provide routes, schedule and fare information on their web sites.

A supplemental survey of intersection camera installations in the Greater Vancouver municipalities discovered that there are a limited number of camera installations however, the vast majority of these installations are used to obtain traffic data for local intersection control and are only available on dial-up connections. Only the City of Vancouver reported that they are presently displaying intersection camera images on their web site. They publish images from only 6 intersections, out of the approximately 500 intersections managed by the City.

The key conclusions of the survey were:

1. Traveller information is currently available from many agency web sites
2. Traffic data and CCTV images from the major tunnels and bridges are not available and would require upgrades to the Ministry's traffic management systems
3. Real-time incident information could be obtained from E-COMM CAD system
4. Road closures and condition information from the Greater Vancouver municipalities are not generally available and for most municipalities would require a new system to collect and disseminate the information

3 SUSTAINABILITY AND GOVERNANCE

As a pre-requisite of the development and deployment of a Regional ATIS, an appropriate institutional framework should be defined for its sustained operation, maintenance and enhancement. The project team reviewed recent ATIS deployments in North America, identified the key institutional and financial issues for consideration by the ITS Corporation and recommended an institutional framework for the Regional ATIS.

3.1 Issues for Consideration

The provision of traveller information is a very broad and diverse service that requires the consideration of many different factors and the interests of a broad range of users. In this section, key factors relating to the governance of an advanced traveller information system (ATIS) were introduced and evaluated. These factors then became the basis for the development and evaluation of various alternatives and the formulation of the final recommendation.

3.1.1 Institutional Issues

To date, traveller information services for the Greater Vancouver region are not coordinated or integrated amongst agencies. The development of the Regional ATIS will require a partnership arrangement among public agencies and/or the private sector that takes into account the current daily operations of these participants and how traveller information can be collected as quickly and efficiently as possible without unduly impacting each participant's policies, procedures and manpower requirements.

The institutional issues considered were:

- Hosting of Regional ATIS
  - Standalone system operating on 24-hour-day, 7-day-week basis.
- Branding / Marketing
  - Offer of basic services for free or at low cost; and
  - Price value-added services according to willingness to pay by means of market segmentation and branding.
- Ownership of Data
  - Data and intellectual property owned by governance body; and
  - Granting of ownership to private sector encourages innovation with potential increase in market and revenue generation.

3.1.2 Financial Issues

To date, the ATIS market is still maturing with viable business models for payment of ATIS services yet unproven. Recent ATIS deployments in the US, which set out to achieve cost recovery, were not sustainable due to lack of revenue. The commercialization of traveller information has been dominated by the broadcast of traffic reports on "barter" arrangement and packaging the information with other services, such as news and local content.

In conclusion, in the near term, public sector funding will still be necessary to deploy and operate a Regional ATIS in Greater Vancouver. In the next three- to five-year timeframe however, it is anticipated that a market could be developed for this service whereby revenue might be secured generally from advertising, subscriptions and sponsorships. It is expected that revenue would increase over time with corresponding reductions in public sector financial support to the point where revenues could sustain the system. Cost sharing between the public and private sector partners is also seen as an option to achieve sustainability.

3.2 Institutional Framework

3.2.1 Attributes

The key attributes considered in the development of the Institutional Framework included:

- Role of ATIS –whether the ATIS is to be public policy-driven or market-driven;
- Leadership – identification of public sector leader and lead ATIS operator;
- Roles and responsibilities of participants – selection of participants on a "non-exclusive" basis with clear definition of roles and responsibilities;
- Coordination among participants – formulation of governance structure and coordination mechanism;
- Infrastructure – availability of ATIS infrastructure and the value of associated data;
- Revenue needs and sources – dependent on size of ATIS market and availability of accurate and timely traffic data over a wide geographic area;
- Legal and administrative issues – mandate of lead agency and the participating agencies, implication of revenue generation, ownership / intellectual property rights, and granting of data access; and
- Public-Private partnerships – flexible structure to account for and accommodate any required changes, and a mechanism for such review and the resulting decision-making process.

3.2.2 Other Jurisdictions

The lessons learned from similar ATIS experiences in Canada and the US include the requirements to:

- Provide the end users with a desired service;
- Build on existing relationships with stakeholders;
- Encourage private sector participation;
- Develop the management structure in a pro-active manner;
- Define explicit roles and responsibilities;
- Select the appropriate procurement mechanisms and streamline the process;
- Assign intellectual property rights fairly;
- Address the ownership, use, and distribution of data and information;
- Develop policies that govern operations; and
- Plan for future expansion.

3.2.3 Options

Currently within the Greater Vancouver region, individual public and private sector agencies are responsible for specific subsets of the transportation system as well as for the operation of fleets and provision of transportation services. Each agency has primary or sole decision making authority over the infrastructure and/or services within their jurisdiction. The institutional framework for the Regional ATIS must assist these agencies to deal with issues such as inter-agency coordination, cost sharing, legislative and legal issues, while maintaining public and political awareness. The options for an institutional framework include:

- Public Agency Framework
  - Expansion of ITS Corporation
  - New Regional ATIS Coordinating Body
  - Inter-Agency Agreements
- Public-Private Partnership

  - Functional Division of Responsibility
  - Public-Private Consortium
  - Cost Sharing
- Contracting for Services
  - Service Contracts
  - Public Turnkey
  - Public-Private Competition

3.2.4 Recommendation

With the ATIS field evolving so rapidly, the institutional framework is likely to evolve over time. New and different public and private relationships will become apparent as the market size and revenue potential for the value-added services become clearer. For this reason, the recommended institutional framework for a Regional ATIS within Greater Vancouver is based on providing the most effective means of implementing and managing traveller information while providing flexibility for future developments. The recommended approach is also one that fits within current institutional boundaries without requiring any significant deviation from existing policies or procedures or need for legislative changes.

- Initial Phases
  - Public agency framework;
  - Set up of separate entity governed by ITS Corporation;
  - Public sector to take lead in data collection, data fusion, packaging and database management; and
  - Private sector to take initiative in providing value-added and customized services.
- Subsequent Phases
  - Build on economic momentum leading to 2010 Winter Olympics;
  - Addition of users, targets and tools; and
  - Increased role of private sector.

4 FUNCTIONAL DESIGN

The purpose of this task was to provide a system overview from the perspective of future ATIS users. Using a system development approach, the results of the technical system inventory were analysed and a Concept of Operation developed, leading to the formulation of a system architecture. The concept of operation and system architecture will provide guidance and direction to help ensure that subsequent design and development result in systems that best serve the needs of the Region, and which represent an effective utilization of limited budgetary funds. The Functional Design working paper is attached as an appendix to this report.

4.1 Concept of Operation

4.1.1 Geographical Coverage

The geographical coverage area for the Regional ATIS, which includes the Greater Vancouver region and the inter-regional links, is tabulated as follows:

Table 4-1 : Geographical Coverage

Greater Vancouver Region	Inter-regional Links
• Anmore • Belcara • Bowen Island • Burnaby • Coquitlam • Delta • Langley City • Langley Township • Lion's Bay • Maple Ridge • New Westminster • North Vancouver City • North Vancouver District • Pitt Meadows • Port Coquitlam • Port Moody • Richmond • Surrey • Vancouver • West Vancouver • White Rock	***British Columbia Interior:*** • Highway 7 (at Mission) • Highway 1 (at Abbotsford)
	Canada-U.S. Border: • Highway 99 (Peace Arch) • Highway 15 (Pacific Highway Border Crossing) • Highway 13 (Aldergrove Border Crossing) • Highway 11 (Huntington Border Crossing) • Washington State
	Squamish / Whistler: • Highway 99 North (Sea to Sky Highway)
	Gulf / Vancouver Islands: • Tsawwassen Ferry Terminal • Horseshoe Bay Terminal
	Ports: • Vancouver Port Authority (& Deltaport) (VPA) • Fraser River Port Authority (FRPA) • North Fraser Port Authority (NFPA)
	Airports: • Vancouver International Airport (YVR) • Abbotsford International Airport (YXX)

Greater Vancouver Region	Inter-regional Links
Other Municipalities • Abbotsford • Mission	***Rail:*** • VIA Rail • Amtrak

4.1.2 Major Data Sources

The major sources of ATIS data in the initial stage (short term) include:

- TransLink ('Greater Vancouver Transportation Authority');
- British Columbia Ministry of Transportation ('MoT');
- Commercial Vehicle Safety and Enforcement Division (CVSE) of Ministry of Public Safety and Solicitor General;
- Greater Vancouver Municipalities (e.g., Vancouver, Richmond, Delta, Surrey, Coquitlam, etc.);
- Vancouver International Airport Authority ("YVR");
- E-Comm Public Safety - Computer Aided Dispatch (CAD);
- Vancouver Port Authority ('VPA');
- Canada Border Services Agency
- US Department of Homeland Security – Customs and Border Protection
- BC Ferries Corporation;
- Transport Canada; and
- Environment Canada.

Other identified sources of traveller information that may be incorporated in Phase 1 include:

- Other ferry services (e.g., Harbour Lynx, Aqua Bus, False Creek Ferries, etc.);
- Vancouver Trolley Bus Service;
- Jack Bell RideShare; and
- Private and Inter-regional Bus Services (Pacific Coach, Perimeter, Airporter, Greyhound).

4.1.3 Application of ATIS Information to Various User Groups

The identified users of the Regional ATIS for Greater Vancouver include the general public and commercial operators and they can be generally classified as follows:

- General Public
  - Motorists
    - Regular commuters; and
    - Occasional users and tourists.
  - Transit Users
    - Regular commuters; and
    - Occasional users and tourists.
  - Cyclists
  - Pedestrians
- Commercial Operators
  - Emergency services including E-Comm; and
  - Private fleets (CVO, taxis, buses, etc.).

The application of ATIS information to the various user groups is summarized in the table below.

Table 4-2: Application of ATIS Information to Various User Groups

Descriptions	Information Type	Motorists	Transit Users	Commercial Operations
Real-time Information:				
Traffic conditions (e.g., incidents, congestion, travel times / speed, etc.)	Real Time	√		√
Roadway conditions	Real Time	√		√
Bridges & tunnels service status (e.g., open, closed, etc.)	Real Time	√		√
Transit service status (e.g., cancellation, delay, etc.)	Real Time		√	
Environmental information (e.g., weather, air quality, etc.)	Real Time	√	√	√
Safety advisory (e.g., chemical spillage, etc.)	Real Time	√	√	√
Emergency information (e.g., evacuation, etc.)	Real Time	√	√	√
Parking availability (e.g., number of spaces available)	Real Time	√	√	
Weigh station information	Real Time			√
Border wait time	Real Time	√	√	√
Static Information:				
Highway / arterial route maps	Static	√	√	√
Transit maps	Static		√	
Closest stops / stations	Static		√	
Transit schedules and routes (e.g., bus, train, etc.)	Static		√	
Transfer details including route, required transfers, transfer location	Static		√	
Fare information	Static		√	
Special events	Static	√	√	√
Parking and ridesharing information	Static	√	√	
On-line trip planners	Static	√	√	
Facilities for disability access	Static		√	
Commercial vehicle permits and route restrictions	Static			√
Canada-U.S. border initiatives / customs service status	Static	√		√
Real-time / Static Information :				
Port information (e.g., ferries arrival/departure schedules, parking availability)	Real Time Static	√	√	√
Airport information (e.g., flight arrival/departure schedules, parking availability)	Real Time Static	√	√	√
Interregional Rail Information (e.g. trains arrival/departure, schedules)	Real Time Static	√	√	

4.1.4 Dissemination Methods

The Regional ATIS for Greater Vancouver will gradually develop over time as information (such as real time congestion data, planned transit interruptions, incident detection, etc.) becomes more widely available and dependable. For the initial phase, a web portal will be used as the primary tool to disseminate traveller information. Other mechanisms, to be considered in future phases, include commercial media (TV, radio, satellite), kiosks, roadside dynamic message signs (DMSs), email, phone, personal digital assistants (PDA), in-vehicle navigation units, etc.

In summary, the dissemination methods and their deployment schedule are:

- Short Term
  - Web portal
  - Media (TV, radio)
  - Phone (GSM/GPRS/1XRTT)
  - Pagers
- Medium Term
  - Kiosks
  - Email
  - Personal digital assistants (PDA)
- Long Term
  - Dynamic message signs (DMSs)[2]
  - In-vehicle navigation units

At the initial stage, the Regional ATIS for Greater Vancouver will be developed for English-language dissemination only. The needs of non-English speakers however, will be addressed through effective use of graphics and icons.

4.1.5 Web Portal

The web portal for the Regional ATIS will present a single, comprehensive source of information to travellers within the region. From this single source, travellers and commercial vehicle operators will have access to all of the information in a simple, intuitive format (see Figure 4.1 for a prototype of the event filtering capability). This portal will meet the needs of the travellers with disabilities, with use of accessible methods and techniques as defined by the W3C Web Content Accessibility Guidelines. The portal will combine information that is retrieved from stakeholders' established web sites and portals into a common look and feel to ensure that the user can obtain all of their travelling information needs from a single source. The Web Portal Prototype Description working paper is attached as an appendix to this report.

[2] Existing DMSs, operated by the BC Ministry of Transportation, have been incorporated into the Phase 1 design.

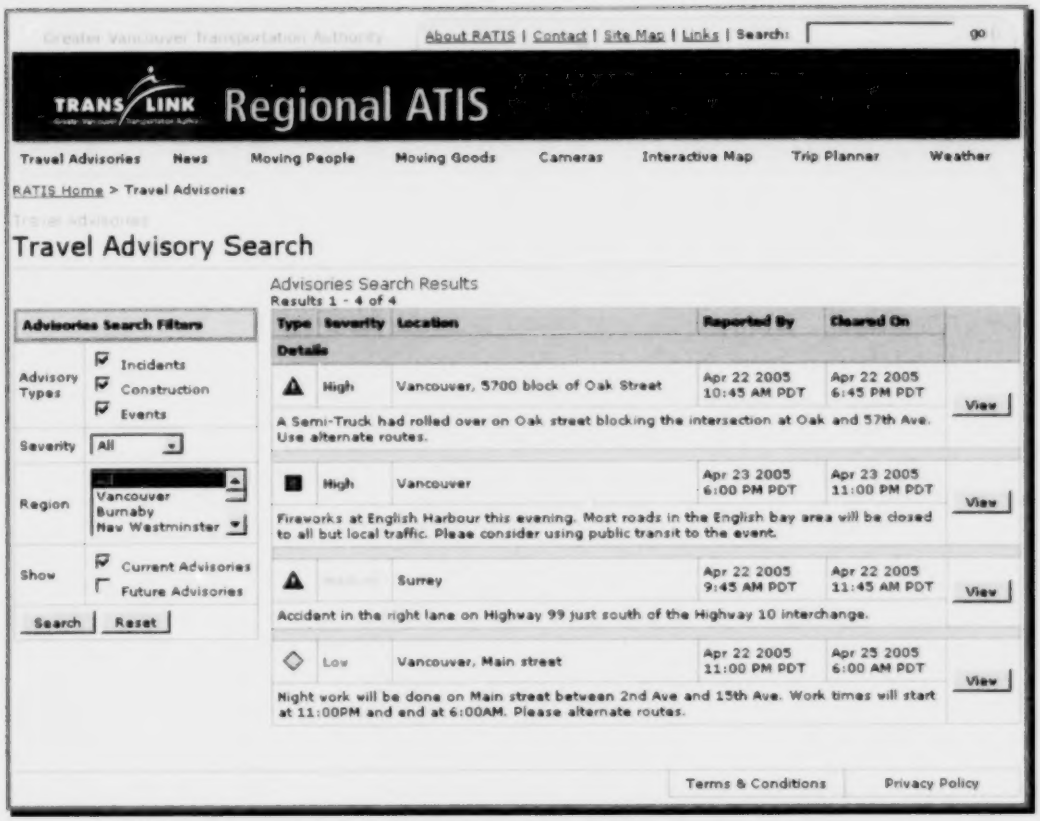

Figure 4-1: Regional ATIS – Web Portal – Filter Events

The cornerstone of the portal will be a feature-rich interactive map that will present numerous layers of information to the traveller (see Figure 4.2 for a prototype of interactive map). It will allow the user to view current incident and congestion information in a graphical form, and further allow the use of toggle switches to include/exclude the road, rail, marine and air travel networks at the same time. Travellers will also have the ability to locate and view images from all traffic and border cameras situated on the same map as they choose. The interactivity of the map will present the user with the ability to customize the view to fit their travelling needs. Finally, the map will be designed to allow the user to zoom into a specific region, and then pan the view of the map across the region, allowing even greater control over what the traveller sees.

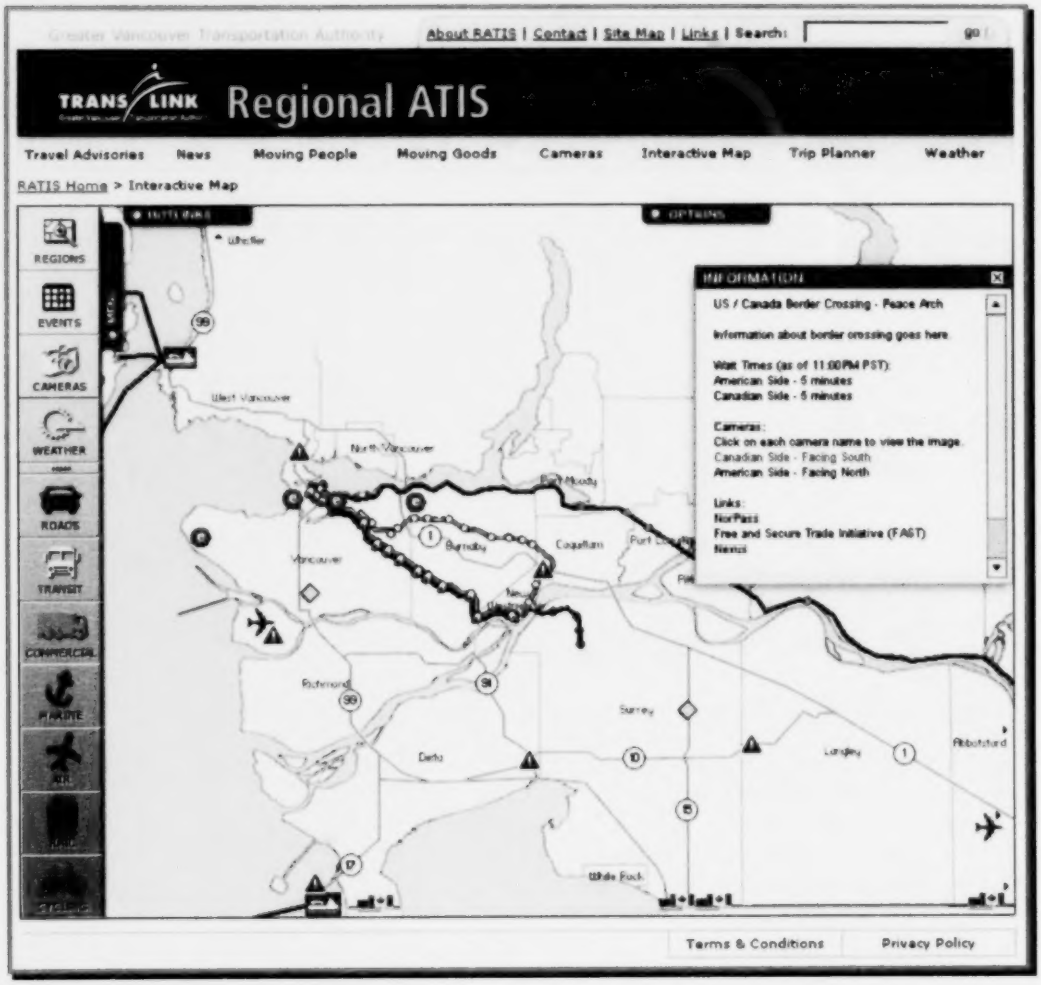

Figure 4-2: Web Portal – Interactive Map

Incident and event information, transit and border delay information and news will be available from both the Web Portal home page and from a more detailed information page that will allow the traveller access to descriptions of situations they may need to take into consideration when planning their trip. This information will be presented in a news format that includes a geographic filter to make it easy to exclude information that does not apply to the area the traveller is interested in.

While the traffic and border cameras will be available through the interactive map, a separate section of the portal will be dedicated to cameras to allow the traveller to quickly and easily navigate to a camera, or a series of cameras, see Figure 4.3 for a prototype of the camera filter and view.

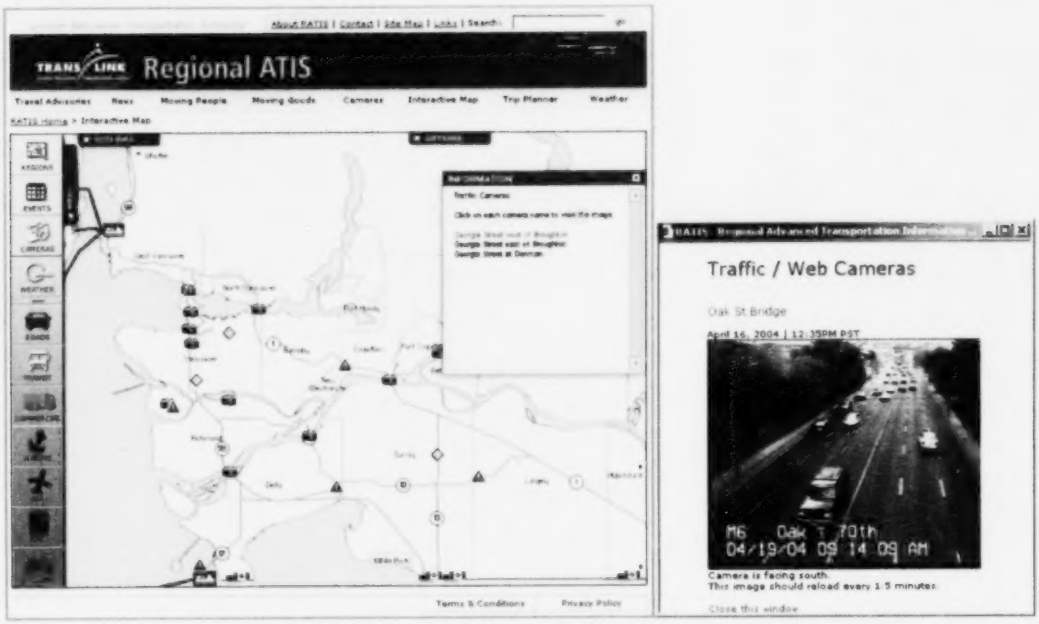

Figure 4-3: Web Portal - Traffic Camera Filter and View

Additional content areas include:

- Motorist specific information
- Public transit information including buses, rail, and marine
- Commercial transit information including buses, rail, marine and air
- Commercial vehicle operator focused information
- Cycling information
- Current weather and forecasts
- Information for handicapped travellers
- Tourist resources

The web portal will use a content management system to provide for the management and organization of the content presented on the web portal.

4.2 System Architecture

4.2.1 Architecture Framework

In general, the steps to defining the System Architecture for the Regional ATIS, using the ITS Architecture for Canada as a tool, included:

- Identifying user services and sub-services to meet the requirements and needs for traveller information within Greater Vancouver;
- Tracing the relevant market packages from the user requirements;
- Modifying the market packages to meet the unique features of the Regional ATIS; and
- Summarizing these market packages with respect to common elements for integration into the overall System Architecture.

In consideration of the user requirements and the information needs of the various user groups, the following market packages from the ITS Architecture for Canada have been identified as being relevant to meeting the specific needs for the deployment of the Regional ATIS:

- Interactive Traveller Information
- Broadcast Traveller Information
- Traveller Services Payment and Reservation
- Ride Matching
- Autonomous Route Guidance
- Dynamic Route Guidance
- Environmental Information Dissemination
- Archived Data Mart
- Archived Data Warehouse

The overall system architecture diagram, representing the long-term vision and framework of the Regional ATIS, is presented in Figure 4.4. This diagram was developed by adapting the above market packages the unique features and requirements for traveller information within Greater Vancouver.

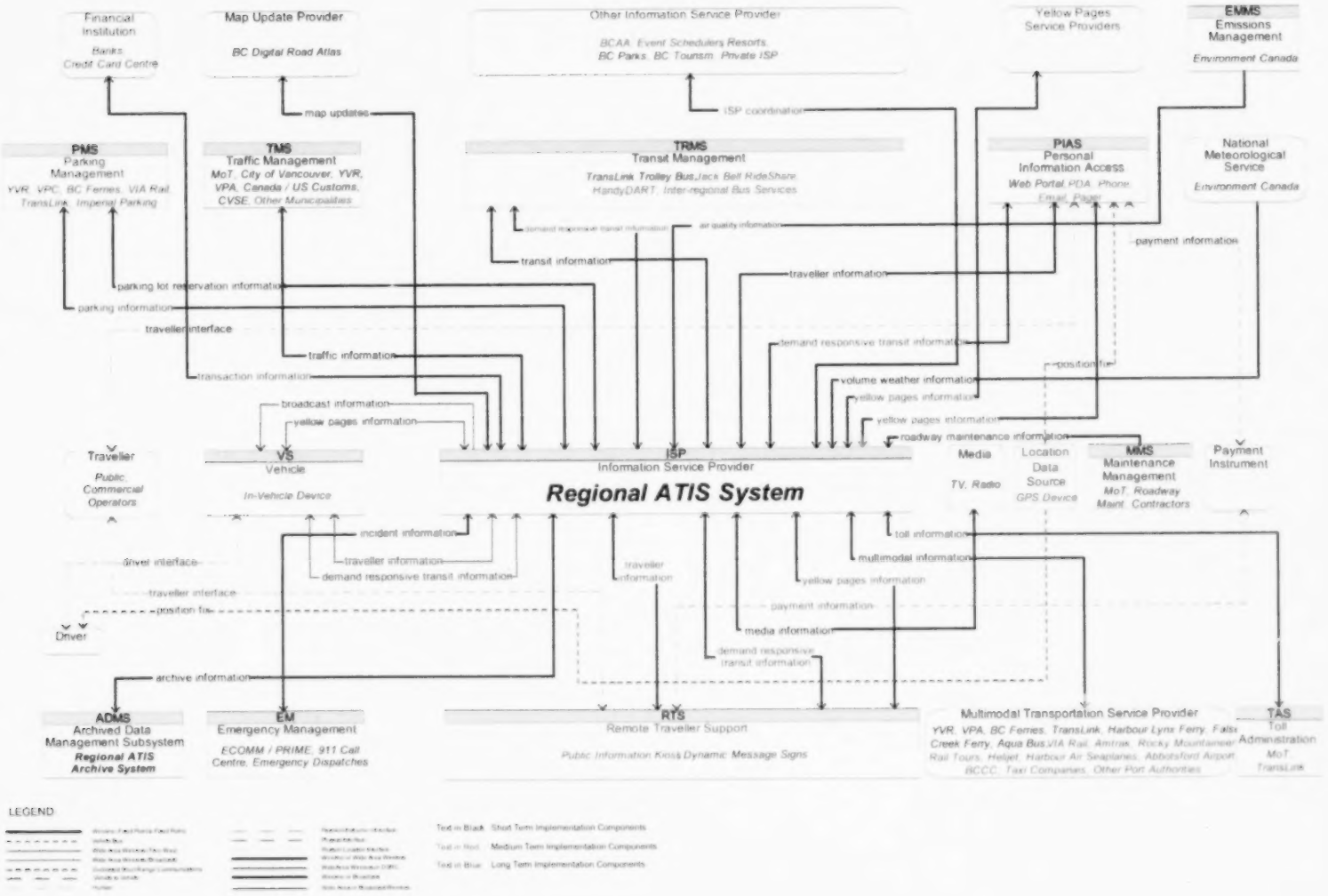

Figure 4-4: Overall System Architecture Diagram

4.2.2 Implementation Phasing

With the opportunity for multiple information and delivery mechanisms to provide traveller information, the intent is for the Regional ATIS to be implemented over three distinct phases as follows:

- Phase 1
  - Integration of existing information sources and any other feasible sources that come online during the deployment period, and
  - dissemination via a public web portal;
- Phase 2
  - Addition of other sources of data as they come online or new information sources (as generated by new deployments pursued independently by the member agencies);
  - addition of mode choice planner tools and support; or
  - additional dissemination technologies, such as phone, personal digital assistants (PDA), e-mail and kiosks.
- Phase 3
  - ATIS initiatives requiring larger capital investments, such as predictive systems ; and systems that require a high degree of data fusion from multiple sources and agencies.
  - Dissemination via DMS or in-vehicle devices.

Based on the phased implementation approach, the overall system architecture framework has been assessed to identify the subsystems / functions for short, medium and long-term implementation and to meet the following objectives:

- Short-term Implementation by Q2-Q3 2005: (Shown in Black in System Architecture)
  - Deploy regional ATIS infrastructure by means of central data repository (i.e., ATIS server), communication links to agencies, data exchange framework, and data fusion / verification / transformation;
  - Integrate primary data sources with use of existing available data; and
  - Provide web portal to public with "display" information.
- Medium-term Implementation between 2005 to 2007: (Shown in Red in System Architecture)
  - Deploy mode choice planner tools by means of multi-modal route planner and yellow pages;
  - Integrate secondary and new data sources with use of new systems (i.e., advanced traffic management systems, automatic vehicle location systems, parking systems); and
  - Expand dissemination via use of phone, personal digital assistants (PDA), e-mail, kiosk, and other information service providers.
- Long-term Implementation beyond 2007: (Shown in Blue in System Architecture)
  - Deploy more tools by means of travel prediction, travel reservations (i.e., parking, demand transit);
  - Integrate new data sources with use of new systems (i.e., tolling system); and
  - Expand dissemination via use of dynamic message signs and in-vehicle devices.

The short, medium and long-term implementation components are illustrated in the System Architecture refer to Figure 4.4.

The data sources that are to be connected to the web portal under the short-term implementation are listed as follows:

- Traffic Management Subsystem:
  - Image capture of existing traffic cameras;
  - Traffic speed, volume and occupancy;
  - Road conditions, incidents, road closures, and driving related weather data;
  - Road construction for major projects;
  - Status of lanes (i.e., Massey Tunnel, Lion's Gate Bridge, Pitt River Bridge);
  - Status of swing bridge (i.e., Pitt River Bridge);
  - Dynamic sign messages;
  - Weigh station information;
  - Airport transportation information; and
  - Border delays.
- Transit Management Subsystem:
  - Transit routes, schedules and fares; and
  - Trip planner.
- Multimodal Transportation Service Provider:
  - Flight schedules;
  - Real-time flight information and notification;
  - Annual cruise schedule;
  - Ferry routes, schedules, fares and service notifications; and
  - Real-time ferry departure and wait times.
  - Inter-regional rail routes, schedules and fares
- Emergency Management Subsystem:
  - Incident information for Vancouver, Richmond and RCMP for some municipalities.
- Emission Management Subsystem:
  - Air quality forecasts for May-September only.
- Maintenance Management Subsystem:
  - Road conditions and incidents.
- National Meteorological Service:
  - Weather forecasts, weather warnings and radar maps.
- Map Update Provider:
  - Base maps and attributes (i.e., road network, addresses, navigation).
- Personal Information Access Subsystem:
  - Traveller information;
  - Yellow pages information; and
  - Individual transit trip planners.

5 SYSTEM DESIGN

The purpose of this task is to determine the system design of the Regional ATIS. Using a system development approach, the system design will satisfy the needs and requirements stated in the concept of operations and system architecture for the first phase of the deployment. The System Design working paper is attached as an appendix to this report.

5.1 System Overview

The system design for the initial (phase 1) deployment of the Regional ATIS, with the system diagram illustrated in Figure 5.1, consists of the following major components:

- Web Portal System
- Database Management System
- ATIS Data Exchange Network (DEN)
- Content Management System (CMS)
- External Interfaces:
  - Ministry of Transportation of British Columbia (MoT) – Bridge and Tunnel Systems
  - Ministry of Transportation of British Columbia (MoT) – DriveBC
  - Greater Vancouver Region Cities (Road Condition Reporting System)[3].
  - E-Comm (CAD System)
  - BC Ferries
  - Environment Canada

[3] Since the writing of this report, TransLink has received confirmation that Transport Canada has awarded funding to implement a CARS solution for the Road Condition Report System.

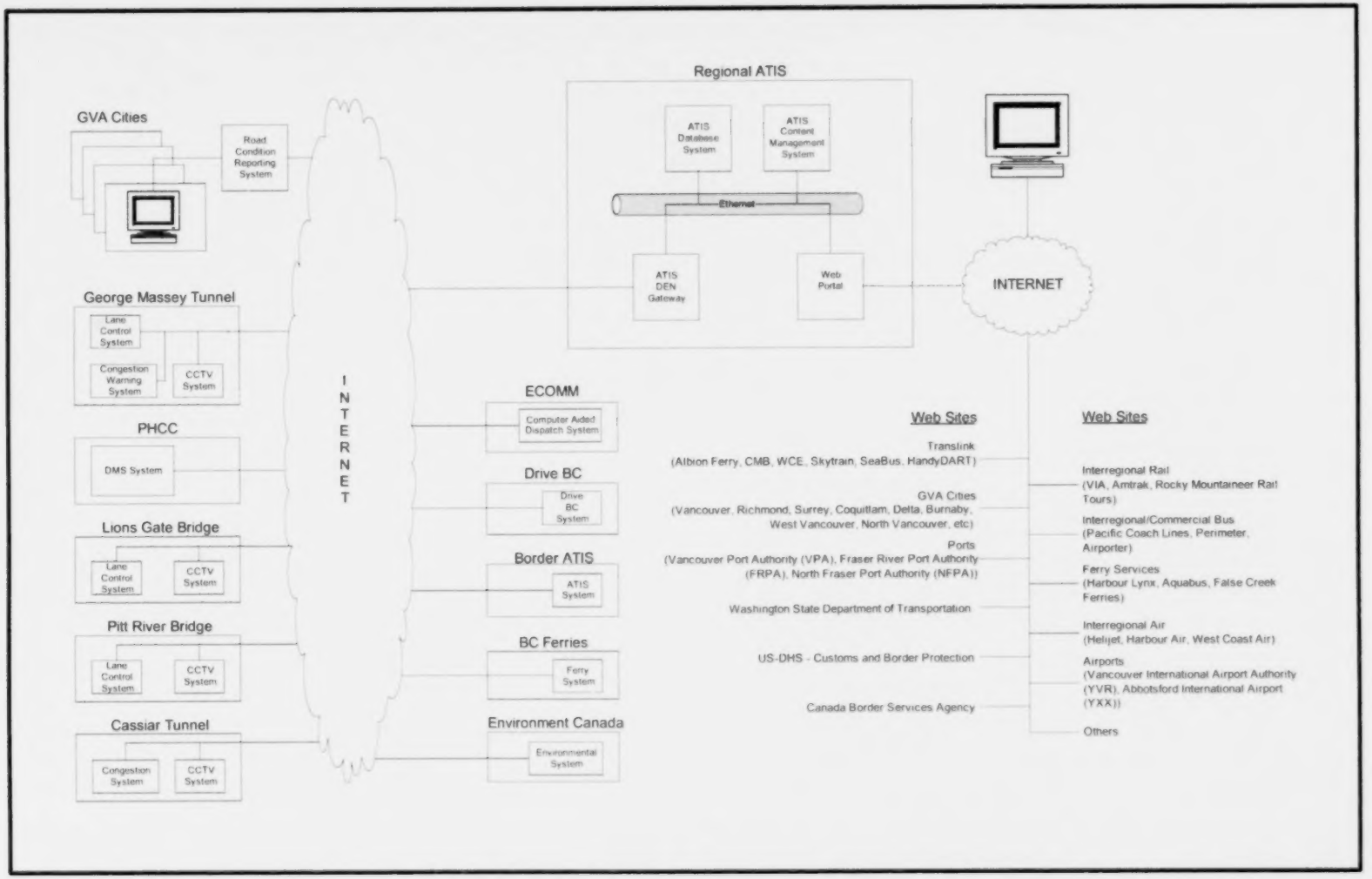

Figure 5-1: System Design Diagram

5.2 Sub-Systems

5.2.1 Web Portal System

The web portal system provides the primary public access to the Regional ATIS. The web portal will present traveller information that has been gathered from other agencies systems and web sites. The information will be gathered through defined interfaces to the agencies systems using ITS center-to-center (C2C) protocol standards where possible. Where limitations exist, interfaces to legacy protocols will be utilized.

The web portal will be developed in compliance with guidelines for ITS web sites developed under the Enterprise ITS Internet project. The portal design will also adhere to the W3C Accessibility Guidelines available at www.w3.org/WAI to help ensure that the information is available to the widest public audience.

5.2.2 ATIS Data Exchange Network

The ATIS data exchange network (DEN) will manage the gathering of information using either C2C standard or legacy protocols through a gateway.

The ATIS DEN is based on the data exchange model defined by the Enterprise ITS Internet project. This model is uses the XML family of protocols standardized by the World Wide Web Consortium (W3C). The NTCIP C2C working group is currently developing a C2C protocol based on XML and is favouring two approaches. The first approach uses the W3C standard web services architecture (WSDL, SOAP and HTTP) and the second, is a simple file transfer approach using FTP or HTTP.

The file transfer approach is a transfer of an XML formatted message between two systems using a file transfer protocol, usually FTP or HTTP, to transmit the file. This is a unidirectional approach where the receiver has the responsibility for obtaining the information and there is no built-in command or control capability, however, it is a simple, low cost and low complexity approach.

The W3C web services approach uses Universal Description Discovery and Integration (UDDI) to locate the publisher of the information and the Simple Object Access Protocol (SOAP) over HTTP to support the exchange of messages. SOAP provides a standard method to structure XML messages, provides conventions for message dialogues and defines the how to send the messages. This approach supports multiple message passing paradigms, so the developer can choose either request/response, publish/subscribe, or fire and forget methods. Table 5.1 summarises the DEN in the context of the ISO OSI seven (7) layer model:

OSI Layer	Area	XML Direct	Web Services
Application	Software Applications	TMDD, ATIS, IM	TMDD, ATIS, IM
Presentation		XML	XML, WSDL
Session		HTTP,FTP	HTTP, SOAP
Transport	Communications Equipment	TCP, UDP	
Network		IP	
Data Link		Ethernet	
Physical	Cabling	Fibre, Twisted Pair, Wireless	

Table 5-1: ATIS Data Exchange Network Model

The ATIS DEN gateway will filter and fuse the information from each agency and store the result in a common format in the database management system as illustrated in Figure 5.2 below. The Regional ATIS will obtain traveller information from data source agencies using the DEN and then publish the information to the public via the web portal or DEN and to private information service providers. The private information service providers will use the information to provide 'value added' services.

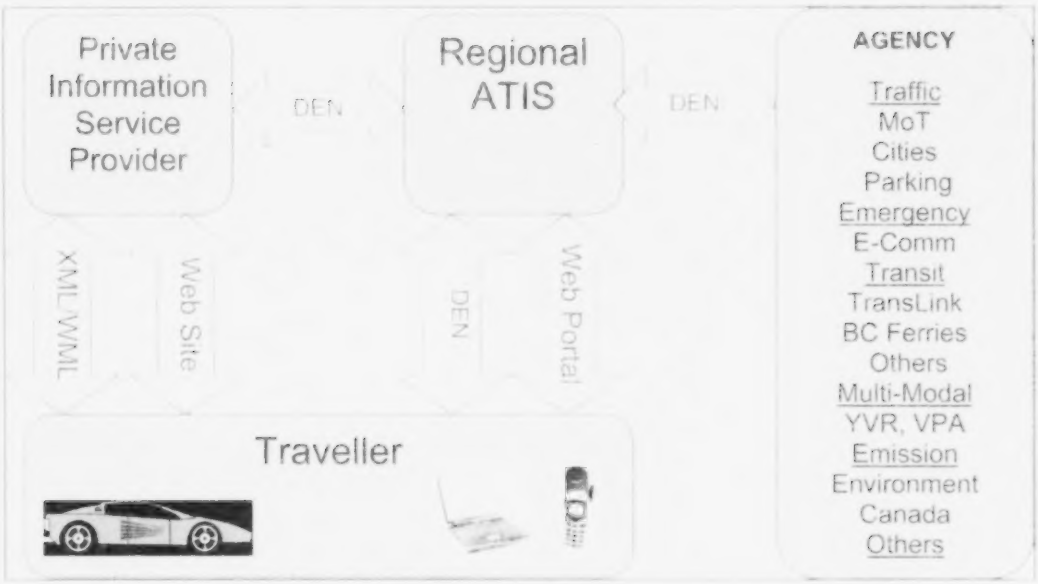

Figure 5-2: ATIS Data Exchange Network

Application	Software Applications	TMDD, ATIS, IM	TMDD, ATIS, IM
Presentation		XML	XML, WSDL
Session		HTTP,FTP	HTTP, SOAP
Transport	Communications Equipment	TCP, UDP	
Network		IP	
Data Link		Ethernet	
Physical	Cabling	Fibre, Twisted Pair, Wireless	

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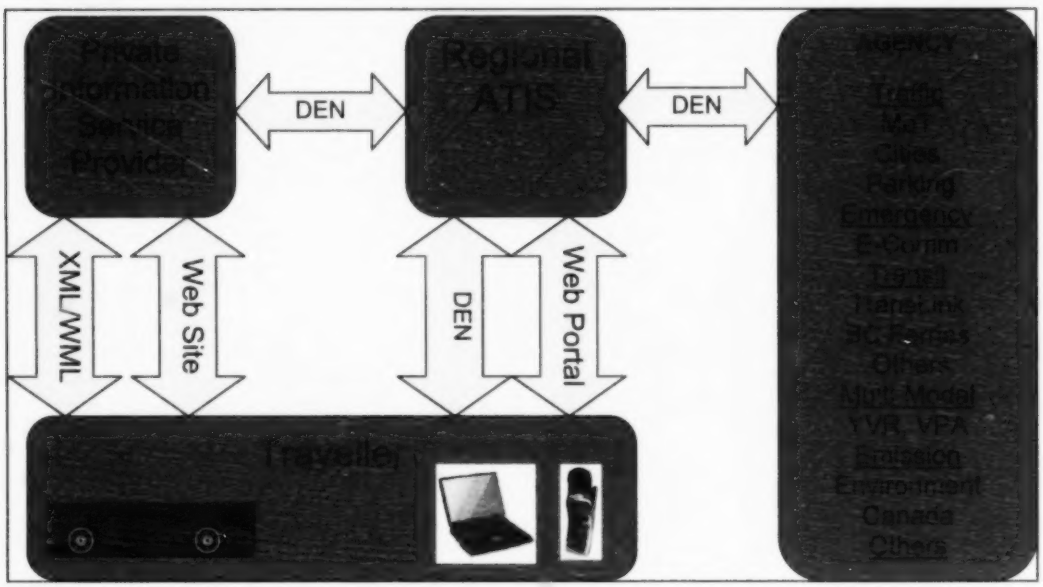

Figure 5-2: ATIS Data Exchange Network

5.2.3 Content Management System

The Content Management System (CMS) will provide functionality to address web site content creation; content publishing; and controlled access to published content. A commercial CMS tool will be used to provide the CMS functionality.

A CMS will allow authors to build and contribute rich web content. Web content management is driven from the template principle, whereby the author can create the content in variety of tools like Word or other graphic tools and then submit the content into a CMS using templates. A commercial CMS tool will be acquired to provide the CMS functionality.

5.3 External Interfaces

The Regional ATIS will obtain traveller information through the external interfaces to other agencies' existing systems. Some of the agencies systems require upgrades to publish information to the ATIS. The following table identifies the agencies' systems proposed for integration in the Phase 1 implementation and the type of upgrades required.

Table 5-2: Agency System Upgrades

Agency	Data	Upgrades
MoT – George Massey Tunnel	• CCTV images • Lane status • Traffic data • VMS messages	• Upgrade to publish data from existing Lane Control and CCTV systems to Regional ATIS using DEN
MoT – Lion's Gate Bridge	• CCTV images • Lane status	• Upgrade to publish data from existing Lane Control and CCTV systems to Regional ATIS using DEN
MoT – Pitt River Bridges	• CCTV images • Lane status • Swing bridge status	• Upgrade to publish data from existing Lane Control and CCTV systems to Regional ATIS using DEN
MoT – Cassiar Tunnel	• CCTV images • Traffic data	• Upgrade to publish data from existing CCTV system and traffic detectors to Regional ATIS using DEN
E-Comm	• Traffic incidents • Hazards • Safety warnings	• Upgrade to filter and publish data from existing Computer Aided Dispatch System to Regional ATIS using DEN
Greater Vancouver Region Cities	• Construction • Maintenance • Special events	• Provide system for data entry and reporting of construction, maintenance and special events • Send data to Regional ATIS using DEN

The tender specifications for upgrades to the BC Ministry of Transportation's (MoT) tunnel and bridge ITS's were developed according to the Ministry's standards and will be tendered under the Ministry's standard procurement process.

The BC Ministry of Transportation (MoT) DriveBC system, which provides road and driving condition, incident data and driving related weather data, will provide information on the provincial highways in Greater Vancouver via the Ministry's public web site.

6 CONCLUSION

A Regional ATIS would make better use of available information and communications technologies to deliver travel information in a timely manner to a wide range of travellers using different modes of travel. The concept of operations for the Regional ATIS has been developed by identifying existing and future prospective information resources from member agencies (as well as other stakeholders) and integrating them to provide a unified traveller information service within the Region. The design, which has taken into consideration potential institutional issues, technology, operation, and maintenance, also includes the definition and outline of the ATIS service. In addition to providing a functional concept, the ATIS design offers a cost effective and constructible solution for project execution and system implementation at present, as well as a feasible integration path for future project phases that will come on line as new data sources and dissemination technologies are implemented.

The first phase implementation will demonstrate the feasibility of the multi-agency regional ATIS design; deploy a state-of-the-art web portal; provide compliance with defined and emerging ITS standards and serve as a model for other jurisdictions. It will also provide an opportunity for other jurisdictions to learn about the regional application of advanced traveller information.

Full working papers for each of the major tasks as follows are issued as appendices to this document:

I Technical System Inventory Report, Final, July 21, 2004;
II Sustainability and Governance Models, Final, July 30, 2004;
III Functional Design, Final, June 24, 2004;
IV System Design, Final, July 30, 2004; and
V Web Portal Prototype Description, Final, July 30, 2004.

TRANS LINK

Regional Advanced Traveller Information Systems

APPENDIX I
Technical System Inventory Report

Final
July 21, 2004

DELCAN

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1 INTRODUCTION

1.1 Scope

This report documents the results of the "Technical Systems Inventory" task. The purpose of the task was to identify the available existing and planned databases (technical system inventory) of transportation information within the Greater Vancouver Region that could potentially be used in the Regional ATIS.

The information contained in this report was collect via a survey that was sent to the transportation agencies in the Greater Vancouver Area and adjacent jurisdictions. The results reported were collated into a database and then summarised by information type in this report.

This database of transportation information will be used for the evaluation of ATIS user services in the subsequent functional design task of the RATIS project.

1.2 Related Documents

None

2 SURVEY

2.1 Survey Methodology

A survey form was developed to identify the different types of travel information available and collect some basic technical information including samples. TransLink provided the key contacts at each agency and e-mailed out the surveys on TransLink letterhead. As the survey forms were received, follow up was performed to obtain further clarification or request additional information.

A copy of the letter sent to the key contacts at each agency can be found in Appendix A

A copy of the survey form can be found in Appendix B

2.2 List of Respondents

The survey form was sent to 76 agencies and a total of 37 responses were received as detailed in the following table.

Category	Number Sent	Number Received	% Response
Public Transportation	6	4	67%
Private Transportation	8	4	50%
Gov't Agencies (Canada)	13	8	62%
Gov't Agencies (US)	6	3	50%
Traveller Services	2	0	0%
Other Services	3	2	66%
Parking	2	0	0%
Media Outlets	4	1	25%
Public Safety	8	4	50%
Educational Institutions	3	3	100%
Commercial Vehicle Ops.	1	0	0%
Municipalities	20	8	40%
Totals	76	37	49%

The following table lists the all the agencies contacted and indicates the contact information for those that responded.

Agency Name	Responded	Business Contact Name	Technical Contact Name
Public Transportation			
Amtrak (National Railroad Passenger Corporation)	Yes	Larry Klein	Larry Klein
BC Ferries Corporation	Yes	Craig Elder (or Paul Curtis)	Paul Curtis
Coast Mountain Bus Company	Yes	Terry Peterson	Abby Kidd
West Coast Express	Yes	Tim Shaver	
BC Trucking Association			
Clipper Navigation, Inc. – Victoria Clipper			
Private Transportation			
Greyhound Canada			
Harbor Air (Harbour Air Seaplanes)	Yes	Peter Evans	
Helijet International Inc.	Yes	Rick Hill	Rick Hill
Via Rail Canada Inc.			
Pacific Coach Lines	Yes	Todd Ono	Heather Holbrook
West Coast Air			
Great Canada Rail Tour (Rocky Mountain Tours)	Yes	Ben Guanzon	Ben Guanzon
BC Rail Mailing Address			
Government Agencies (Canada)			
BC Ministry of Transportation	Yes	Ed Miska	Abid Sivic
BC Ministry of Transportation – Delta			
BC Ministry of Transportation – Victoria			
BC Ministry of Transportation (Drive BC)	Yes	Del Mecham	Peter Fu
Canada Customs & Revenue Agency	Yes	Brad Valentine	Brad Valentine
Vancouver Port Authority	Yes	Dennis Bickel	Dennis Bickel
Environment Canada	Yes	David Jones	Dick Boak
TransLink			
TransLink	Yes	Helen Cook	
TransLink			
Transport Canada	Yes	Rod Nelson	Sau Sau Liu
Vancouver International Airport Authority	Yes	Milan Zivkovic	
Government Agencies (US)			
Whatcom Council of Governments			
Washington State	Yes	Paul Neel	Paul Neel

Department of Transportation			
Washington State Department of Transportation			
Washington State Transportation Centre	Yes	Edward McCormack	Edward McCormack
Whatcom Transportation Authority			
US Customs Service, Customs and Border Protection	Yes	Jay Brandt	
Traveller Services			
BCAA			
Port of Seattle			
Other Services			
CanMap (DMTI Spatial Inc.)	Yes	John N. Giannone	Lena Gomes
Tourism Vancouver	Yes	Stephen Regan	
Vancouver Economic Development Commission			
Parking			
Imperial Parking Corporation			
EasyPark			
Media Outlets			
City TV			
CTV			
Global BC	Yes		Vic Main
Corus Radio Vancouver (CKNW)			
Public Safety			
EComm	Yes	Bernie Sparrow	Keith Montgomery
Royal Canadian Mounted Police – Burnaby	Yes	Sgt. Wolfgang Riemer	
Royal Canadian Mounted Police – Richmond			
Royal Canadian Mounted Police – Coquitlam	Yes	Cpl. Tom James	
Royal Canadian Mounted Police – Surrey	Yes	C. Cherniwchan	Shifted Position
Royal Canadian Mounted Police – Maple Ridge			
Vancouver Police Department			
BC Ambulance Service			
Educational Institutions			
UBC (Trek Program)	Yes	Gordon Lovegrove	
Simon Fraser Student Society	Yes	Brandy Zimmerman	Brandy Zimmerman
BC Institute of Technology	Yes	Glen Magel	

Commercial Vehicle Ops.			
Co-operative Auto Network			
Municipalities			
Village of Anmore			
Village of Belcarra			
City of Burnaby	Yes	Bob Baille	Bob Baille
City of Coquitlam	Yes	Rick Adams	Rick Adams
Corporation of Delta	Yes	Colin Redwood	Colin Redwood
City of Langley			
Village of Lions Bay			
District of Maple Ridge			
City of New Westminster			
City of North Vancouver	Yes	Adrienne Mairs	Adrienne Mairs
District of North Vancouver	Yes	Donna Howes, P. Eng	Dan G. Mooney, AScT
District of Pitt Meadows			
City of Port Coquitlam			
City of Port Moody			
City of Richmond	Yes	Joan Caravan	
City of Surrey	Yes	Gary Vlieg	Gary Vlieg
City of Vancouver	Yes	Scott Edwards	
District of West Vancouver			
City of Bellingham			
Port of Bellingham			

2.3 Review of Survey Reponses

The survey responses were reviewed and the potential data that could be used in the Regional ATIS identified. The potential data is categorized four major groupings:

- Road/Traffic Information
- Transit Information
- Multi-modal (Air/Port/Ferry/Rail)
- Environmental

2.3.1 *Road/Traffic Information*

The road/traffic information available is summarized in the following table:

Agency	Source/Location	Potential Data	Issues/Constraints
Ministry of Transportation	George Massey Tunnel	Traffic Data (VOS) – 3 km North and South of tunnel CCTV - 9 cameras on approaches to tunnel Lane Control Status – Direction DMS – 4 signs congestion warning	No access method available
Ministry of Transportation	Lions Gate Bridge	CCTV – 22 cameras Lane Control Status - Direction	No access method available
Ministry of Transportation	Pitt River Bridge	CCTV- 17 cameras Lane Control Status - Direction Swing Bridge Status	No access method available
Ministry of Transportation	Cassiar Tunnel	Traffic Data (VOS) & Congestion – in tunnel CCTV – Tunnel, Second Narrows, Boundary Road CCTV – 19 cameras on Trans-Canada Highway HOV and 2 at Port Mann bridge (March 2004)	No access method available
Ministry of Transportation	Border ATIS	Traffic Data (VOS) – Route 15 and Hwy 99 CCTV – 4 cameras DMS – 2 signs border delay warning	Unknown access method
Ministry of Transportation	Web Cameras	Coquihala Hwy 5 Whistler Hwy 99	
Ministry of Transportation	Drive BC ATIS PHCC	Road Conditions, Incidents, Construction & Maintenance for provincial highways DMS – 4 signs on Massey Tunnel Contraflow, 4 signs on Hwy 99 to Whistler, 2 signs in Abbortsford	Unknown access method
Ministry of Transportation	Hwy 10 & 17	CCTV – at intersection (Traficon – video detector)	No access method available
City of Vancouver	Vancouver	CCTV – 11 cameras on major corridors available on city web site www. roadahead.ca Construction – major events posted on web site – text	Access Agreement for CCTV Construction are manually posted to web site – text format
City of Surrey	Surrey	Construction – major events posted on city web site on static map generated from a GIS	Construction are manually posted on site – static map
City of Richmond	Richmond	Construction – descriptions manually posted to city web site	Construction are manually posted to web site – text format
City of North Vancouver	North Vancouver	Closures – Paper reports only	No Electronic format
City of Coquitlam	Coquitlam	Construction – text brief of major projects manually posted on city web site based on information from Maintenance Management System (MAXIMO)	No access method available

City of Delta	Delta	Construction & Maintenance – details posted to city web site	
City of New Westminster	New Westminster	No data available	No data available
District of North Vancouver		Closures – Paper reports only CCTV - at intersections CCTV – temporary installation for future construction projects i.e. Dollard Twinning	No Electronic format for closures. No access to intersection CCTV's
City of Burnaby	Burnaby	Construction, Maintenance – proposed projects in text and static map on the city web site	Construction are manually posted on site – static map
Canada Border Services	Border Crossing	Border Delays – Estimated wait times at borders posted to web site www.ccra-adrc.gc.ca	Rough estimates made by border staff
US Customs	Border Crossing	Border Delays - estimated delay for border crossing Number of lanes open	Rough estimates made by border staff
A&A Contract Customs Brokers	Border Crossing	CCTV – For all four border crossings in GVA posted to web site www.borderlineups.com	CCTV image not consistent
E-COMM Emergency Communications for Southwest British Columbia	Vancouver, Richmond and RCMP	Incidents – recorded in emergency services records management system. CCTV – temporary installations for special events security	Access Agreement and Negotiations required for access. Issues include security, policy, connectivity
Washington State DoT	State of Washington	CCTV – at border crossing and throughout the state posted to DoT web site Incidents, Construction and Closures posted to DoT web site Traffic congestion – at Bellingham and near border	Access Agreement required

The results of a supplemental survey of CCTV in the GVA cities are presented in the following table:

Municipality	Number	Type	Location	Access Method
Burnaby	114 in total			
	112	Fixed (50%B&W)	30 various intersections	About half have dial up connections. Images are not readily exportable at this time. Fields of view are pretty tight due to detection requirements
	1	PTZ	Royal Oak @ Dover/Oakland	Compressed images through "Adpro" units (28.8 modem connection sped)
	1	PTZ	Gaglardi @ Lougheed	
Coquitlam	13 in total			Dial-up connection via Adpro Fastscan transceiver. Note: Autoscope images have very limited field of view
	1	PTZ	King Edward / Lougheed	
	4	Fixed	King Edward / Lougheed	
	4	Fixed	Austin / Blue Mountain	
	4	Fixed	Guildford / Pinetree	
Delta	6 locations			
		PTZ	Ped overpass on Nordel east of 116th	
		Fixed	56th St and 12 Ave	Autoscope Solopro
		Fixed	Nordel Way and River Road	Autoscope Solopro
		Fixed	River Road and 90th Ave	Autoscope Solopro
		Fixed	Nordel and 116th	Addpro -- can view remotely using a dial up connection
		Fixed	Nordel and Scott (120th)	Addpro -- can view remotely using a dial up connection
Langley Town	18 locations			
	1	PTZ	200 St / 64 Ave	Dial-up modem feeds into central traffic station. Images are available live and are not recorded.
	~11	Fixed	Fraser Hwy at 272, 275, 276 Streets	Images are of traffic right at the stop bar... not likely of interest for traveller information. (Note Fraser @ 275 is 3-legged)
	~16	Fixed	208 Street at 44, 72, 80, 88 Avenues	Unknown
	~16	Fixed	200 Street at16, 32, 44, 64 Avenues	Unknown
	~12	Fixed	64 Avenue at 202, 203, 204 Streets	Unknown
	~8	Fixed	48 Avenue at 219 and 222 Streets	Unknown
	~4	Fixed	Willowbrook Dr at 198 Street	Unknown
Surrey	4	Fixed	Scott Rd at Nortdel Way	Do not access Autoscope images. Note: Province also has a number of red light cameras at various signalized intersections.
Vancouver	6 in total			Photos are posted on webpage and updated every 5 minutes.
	1	Limited PTZ	City Hall roof, facing south	
	1	Limited PTZ	City Hall roof, facing north	
	1	360 degree PTZ	Oak & 70th	
	1	360 degree PTZ	1st Ave & Clark	
	1	Fixed, facing west	Boundary & Hastings	
	1	360 degree PTZ	Georgia & Broughton	

Summary

Reviewing the information available there are some major points:

- Traffic Data (i.e. congestion) - lack of information available on major road corridors
- Construction & Maintenance - lack of consistent information available from the cities
- Incidents - incident information from ECOMM would require negotiations on access

Compared to other major metropolitan areas in North American, the GVA does not have real-time congestion information available on the major road corridors. The Ministry of Transportation has several traffic control centres at the major tunnels and bridges. These centres are the only sources of traffic data currently available. The systems at these centres do not currently provide information to externally, therefore systems infrastructure upgrades would be required in order to obtain the information from the legacy systems.

All the cities that responded to the survey track major construction projects. Most manually post basic project descriptions on their web sites. For example, Coquitlam uses a maintenance management system to track the construction and closures and manually posts the major project descriptions to their web site. The level of detail of the project descriptions varies significantly and there is no consistency in the location details or impact to traffic.

E-COMM (Emergency Communications for Southwest British Columbia) is responsible for the 911 call service for the entire GVA and for the dispatch of emergency services for the Vancouver and Richmond RCMP. As such, they record incidents that are dispatched to the emergency services. This information could be provided to the ATIS. In a number of other North American jurisdictions (i.e. Los Angeles and Chicago) incident data from 911 computer dispatch systems have been successful integrated into regional ATMS/ATIS, so that notification of confirmed traffic accidents and other incidents reported by the police are automatically provided to the traffic agency and regional ATIS.

The use of E-COMM incident information would be subject to detailed negotiations with the agency.

2.3.2 *Transit Information*

The transit information available is summarized in the following table:

Agency	Source/Location	Potential Data	Issues/Constraints
TransLink	Coast Mountain Bus	Schedules, Routes & Fares – static information available on web site and TransLink Trip Planner Incidents – detailed incidents are logged by TCOMM Service Status – manually updated on case by case basis and displayed as current operating conditions on web site Bus Locations – real time locations for 98B line	
TransLink	West Van Blue Bus	Schedules, Routes & Fares – static information available on web site and TransLink Trip Planner	
TransLink	West Coast Express	CCTV – at Waterfront Station Schedules, Routes & Fares – static information available on web site and TransLink Trip Planner Service Status – manually updated on a case by case basis and displayed as current operating conditions on web site	
TransLink	SkyTrain	Schedules, Routes & Fares – static information available on web site and TransLink Trip Planner Service Alerts - manually updated on a case by case basis and displayed on web site	
TransLink	Seabus	Schedules, Routes & Fares – static information available on web site and TransLink Trip Planner	
TransLink	Albion Ferry	Schedules, Routes & Fares – static information available on web site	
TransLink	Handy Dart	Information available on TransLink web site	
TransLink	Park and Ride	Information available on TransLink web site	
TransLink	Bicycle Program	Cycling route map, locker locations, inter-modal connection	Map in paper format.
Pacific Coach	Inter-regional Bus	Schedules, Routes & Fares – for bus & ferry service between Vancouver to Victoria available on company web site	
Airporter	Airport Shuttle Bus	Fares – airport shuttle fares, pickup locations and reservations on company web site	
Perimeter	Inter-regional Bus	Schedules, Routes & Fares – for service to Whistler available on company web site	

Summary

TransLink provides a trip planner on their web site with schedule information of the operating subsidiaries. The trip planner tool and schedule information database was developed by Trapeze Software, a vendor of transit schedule management software. The schedules are exported on a periodic basis to facilitate access by other systems.

2.3.3 Multi-Modal Information

The multi-modal (air/port/ferry/rail) information available is summarized in the following table:

Agency	Source/Location	Potential Data	Issues/Constraints
Vancouver International Airport Authority (YVR)	Vancouver Airport	Flight Status – real-time flight arrivals & departures available on YVR web site Flight Information – arrivals and departure schedules available on YVR web site Parking Information – for YVR available on web site	Access agreement required
Harbour Air Seaplanes	Air Service to Vancouver Island	Flight Schedules, Routes & Fares – departure schedule on company web site	
West Coast Air	Air Service to Victoria	Flight Schedules, Routes & Fares – departure schedule on company web site	
Helijet International	Helicopter Service	Flight Schedules, Routes & Fares – departure schedule on company web site	Access agreement required
Vancouver Port Authority (VPA)	Vancouver Port	CCTV – cameras at access points throughout terminal Cruise Schedule – annual schedule available on VPA web site Dangerous Goods – available in real-time	Access agreement required
BC Ferries	Ferry Service to Vancouver Island	Ferry Schedules, Routes & Fares – departure schedule on agency web site Ferry Sailing and Waits – real-time sailing times Parking availability – real-time Online Reservations	Access agreement required
False Creek Ferries	False Creek	Ferry Schedules, Routes & Fares – departure schedule on company web site	
Aqua Bus	False Creek	Ferry Schedules, Routes & Fares – departure schedule on company web site	
Harbour Lynx	Ferry Service to Nanaimo	Ferry Schedules, Routes & Fares – departure schedule on company web site	
VIA	Inter-regional Rail	Train Schedules – arrival and departure on company web site Online Booking tool	
Amtrak	Inter-regional Rail	Train Schedules – arrival and departure on company web site Online Booking tool	
Rocky Mountaineer Rail Tours	Inter-regional Rail	Schedules, Routes & Fares – for rail service available on company web site	

2.3.4 Environmental

The environmental information available is summarized in the following table:

Agency	Source/Location	Potential Data	Issues/Constraints
Environment Canada		Air quality, weather forecasts, weather warnings, radar maps	Access agreement

Summary

Environment Canada – Metrological Service can provide meteorological information in a variety of formats and is the primary source for this information.

APPENDIX A. SURVEY LETTER

TRANS LINK
Greater Vancouver Transportation Authority

TransLink
1600 – 4720 Kingsway
Burnaby, BC V5H 4N2
Canada
Tel (604) 453-4500
Fax (604) 453-4629
www.translink.bc.ca

December 24, 2003

<Name>
<Address>

Dear <Name>:

Re: Regional Advanced Traveler Information Survey

TransLink and its subsidiary, the ITS Corporation, have retained a consultant, Delcan Corporation, to assist with the design and tendering of a Regional Advanced Traveler Information System. The following provides some brief background information.

Intelligent Transportation Systems (ITS) involves the application of computer, communications, traffic control, and information processing technologies to improve the operation, safety, mobility and air quality of the transportation network. One of the many User Service Bundles identified as part of the ITS Strategic Plan in the Greater Vancouver Region is Traveler Information Services. Under this broad heading, several User Services have been identified, which include Traveler Information, Route Guidance and Navigation, Ride Matching and Reservation, and Traveler Services and Reservations. To facilitate the implementation of some or all of these services, a Regional Advanced Traveler Information System (RATIS) will be implemented, in a staged manner, for the Greater Vancouver region. The first stage will involve integrating existing sources of information into one convenient location for the users.

Specifically, this project will identify currently available traveler information data, fuse them into a single readily available format and set the direction for future enhancements. The traveler information in this first phase will be displayed on a website but future media may include PDA's, cable TV, enroute displays, remote kiosks and telephone.

In order to achieve these goals, the cooperation of numerous agencies and corporations (both public and private) will be required. The attached survey form is the first step to ensure that this project provides the maximum benefit to travelers and service agencies.

The primary purposes of the survey are to:

- Identify what information is available, where is it located and how to best to obtain it;
- Determine the timeliness of the data;
- Identify current/planned information databases;
- Investigate the feasibility of increasing the real-time relevance of the data; and,
- Set the tone for future enhancement to the initial system in accordance with the needs of all parties.

Please note that this project will not affect the autonomy of agency websites or information sources but rather, seeks to enhance quality on the regional site or will direct user traffic to the appropriate location.

The attached survey form is divided into eight major categories, namely:

- Identification of the agency, the agency's jurisdiction(s) and information regarding contacts within the agency;
- Available data;
- Data categories;
- Data assembly methods;
- Current public distribution methods;
- Available data formats;
- Possible future public distribution methods; and,
- Any suggestions or comments.

The survey form is provided in PDF format for manual entry and return by fax to Mr. Ross McLaren, Delcan Corporation, (604-525-9458), and in Word format for direct "electronic" entry and return by email to rossm@delcangroup.com.

We are working to a very tight schedule; therefore a response by January 5, 2003 will be of great assistance. Your cooperation in this matter is highly appreciated.

To view or download the ITS Vision and Strategic Plan document, I encourage you to go to www.itsbc.ca. If you have any questions or concerns, please call me at (604) 453-4602 or our Project Manager, Rob Shirra at (604) 341-1692

Yours sincerely,

Keenan Kitasaka,
Manager, Intelligent Transportation Systems

Enclosure

APPENDIX B. SURVEY FORM

AGENCY NAME: _____

ADDRESS: _____

_____

_____

_____

AGENCY TYPE (TRAVEL MODE):

Urban Bus	☐
Regional Bus	☐
Urban Rail	☐
Regional Rail	☐
Local Ferries	☐
Regional Ferries	☐
Private Media	☐

Port	☐
Air	☐
Parking	☐
Environmental / Weather	☐
Road / Traffic	☐
Emergency Services	☐

BUSINESS CONTACT:

Name: _____

Title: _____

Tel: _____

Cell: _____

Fax: _____

Email: _____

TECHNICAL CONTACT:

Name: _____

Title: _____

Tel: _____

Cell: _____

Fax: _____

Email: _____

SURVEY OF STAKEHOLDERS' DATA

CATEGORY	DESCRIPTION	UPDATE FREQUENCY	DATA FORMAT	ACCESS AGREEMENT REQUIRED?	RATIS ACCESS OPTIONS	INFORMATION DISSEMINATION METHODS							
						PRINT	FAX	TEL	WEB	RADIO	TV	EMAIL	OTHER
☐ Transit Schedules			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Transit Routes			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Transit Service Disruptions			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Travel Times			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Traffic Information (Specify Type) ____			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____

SURVEY OF STAKEHOLDERS' DATA

CATEGORY	DESCRIPTION	UPDATE FREQUENCY	DATA FORMAT	ACCESS AGREEMENT REQUIRED?	RATIS ACCESS OPTIONS	INFORMATION DISSEMINATION METHODS							
						PRINT	FAX	TEL	WEB	RADIO	TV	EMAIL	OTHER
☐ Road Maintenance Schedules			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Road Construction Schedules			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Incidents			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Traffic Congestion / Speeds			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____
☐ Road Conditions			☐ Print ☐ Electronic ____	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other ____	☐	☐	☐	☐	☐	☐	☐	☐ ____

SURVEY OF STAKEHOLDERS' DATA

CATEGORY	DESCRIPTION	UPDATE FREQUENCY	DATA FORMAT	ACCESS AGREEMENT REQUIRED?	RATIS ACCESS OPTIONS	INFORMATION DISSEMINATION METHODS							
						PRINT	FAX	TEL	WEB	RADIO	TV	EMAIL	OTHER
☐ CCTV			☐ Analog ☐ Digital	☐ Yes ☐ No ☐ Maybe	☐ Fibre ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other	☐	☐	☐	☐	☐	☐	☐	☐
☐ Environmental / Weather			☐ Print ☐ Electronic	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other	☐	☐	☐	☐	☐	☐	☐	☐
☐ Other			☐ Print ☐ Electronic	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other	☐	☐	☐	☐	☐	☐	☐	☐
☐ Other			☐ Print ☐ Electronic	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other	☐	☐	☐	☐	☐	☐	☐	☐
☐ Other			☐ Print ☐ Electronic	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other	☐	☐	☐	☐	☐	☐	☐	☐
☐ Other			☐ Print ☐ Electronic	☐ Yes ☐ No ☐ Maybe	☐ Print ☐ Digital Media ☐ Internet ☐ Dial Up Modem ☐ Leased Line ☐ Other	☐	☐	☐	☐	☐	☐	☐	☐

SUGGESTIONS/COMMENTS:

APPENDIX C. DATA SOURCE BY CATEGORY

- Transit Schedules
- Transit Routes
- Transit Service Disruptions
- Travel Times
- Traffic Information
  - Traffic Information – Traffic Patterns
  - Traffic Information – Volume and Speed
- Road Maintenance Schedules
- Road Construction Schedules
- Incidents
- Traffic Congestion / Speeds
- Road Conditions
- CCTV
- Environmental / Weather
- Other
  - Other - APC Data (Automatic Passenger Counts)
  - Other – AVL Locations
  - Other - Bicycle Program
  - Other - Cruise and Ferry Schedule
  - Other – Dangerous Goods
  - Other – Detail Communication Report
  - Other – Ferry Service Notices
  - Other - Flight Information
  - Other – GeoSpatial data
  - Other – ITS devices data
  - Other – Major Construction on CCTV
  - Other – Parking Information
  - Other – Reservation Information
  - Other – Road Closures

Detailed survey data removed

APPENDIX D. DATA SOURCE BY AGENCY

Amtrak
British Columbia Ferry Services Inc.
British Columbia Institute of Technology
Canada Customs and Revenue Agency, Regional Office
City of Burnaby
City of Coquitlam
City of North Vancouver
City of Richmond
City of Surrey
City of Vancouver
Coast Mountain Bus Company
District of North Vancouver
DMTI Spatial Inc.
E-Comm Emergency Communications for Southwest British Columbia Inc.
Environment Canada
Global BC
Harbour Air Seaplanes
Helijet International Inc.
Ministry of Transportation – Provincial Highway Conditions Centre
Ministry of Transportation
Pacific Coach Lines Ltd.
RCMP Burnaby Detachment
RCMP Coquitlam Detachment
RCMP Surrey Detachment
Rocky Mountaineer Railtours
Simon Fraser Student Society
The Corporation of DeltaTourism Vancouver
Translink
Transport Canada, Pacific Region
U.S. Customs and Border Protection
UBC Trek Program Centre
Vancouver International Airport Authority
Vancouver Port Authority
Washington State Department of Transportation
Washington State Transportation Centre
West Coast Express Limited

Detailed survey data removed

APPENDIX E. SUPPLEMENTARY INFORMATION

Airporter
Amtrak
Aquabus
British Columbia Ferry Services Inc.
Blue Bus
Border Line Up
Canada Customs and Revenue Agency, Regional Office
City of Burnaby
City of Coquitlam
City of Richmond
City of Surrey
City of Vancouver
Corporation of Delta
District of North Vancouver
Environment Canada
False Creek Ferries
HandyDART
Harbour Air Seaplanes
Harbour Lynx
Helijet International Inc.
Ministry of Transportation
Pacific Coach Lines Ltd.
Perimeter Transporation
Port of Vancouver
Road Atlas of BC
Rocky Mountaineer
SeaBus
Translink
Transport Canada, Pacific Region
UBC Trek Program Centre
U.S. Customs and Border Protection
Vancouver Trolley Company
Via Rail
Washington State Department of Transportation
West Coast Air
West Coast Express Limited

Detailed survey data removed

TRANS LINK

Regional Advanced Traveller Information Systems

APPENDIX II
Sustainability and Governance Models

Final
July 30, 2004

DELCAN

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1. GENERAL

1.1 Mandate of ITS Corporation

The ITS Corporation ("592040 BC Ltd.") of British Columbia was established on December 3, 1999, as a subsidiary of the Greater Vancouver Transportation Authority ("TransLink"), to define an ITS program and guide the development and implementation of ITS projects in the region and province. The ITS Corporation's board of directors is comprised of representatives from various local transportation organizations:

- TransLink ("Greater Vancouver Transportation Authority");
- British Columbia Ministry of Transportation ("BCMoT");
- Insurance Corporation of British Columbia ("ICBC");
- Greater Vancouver Municipalities;
- Vancouver International Airport Authority ("YVR");
- Vancouver Port Authority ("VPA");
- University of British Columbia ("UBC");
- Pacific Corridor Enterprise Council ("PACE"); and
- Transport Canada ("TC").

As part of the initiative to examine areas of interest to determine the "next step" for joint projects as a result of the completion of the British Columbia's Provincial ITS Vision and Strategic Plan, the ITS Corporation has instigated the development of a concept of operation for a regional advanced traveller information system (ATIS) for Greater Vancouver. The concept of the Regional ATIS is to provide a "one stop" transportation portal to provide multi-modal, multi-jurisdiction, static as well as real-time traveller information for the Greater Vancouver area.

The funding partners for the Regional ATIS project comprise the following agencies:

- Transport Canada;
- TransLink;
- Western Economic Diversification Canada;
- British Columbia Ministry of Transportation;
- Vancouver International Airport Authority; and
- Vancouver Port Authority.

For their contributions of funding, these agencies will maintain certain rights and ownership of the end products, including the data and the intellectual property with respect to this project.

1.2 Scope

This working paper discusses options for the sustainability and governance for the operation, maintenance and enhancement of the Regional ATIS.

2. ISSUES FOR CONSIDERATION

2.1 Introduction

The provision of traveller information is a very broad and diverse field that requires the consideration of many different factors and the interests of a broad range of users. In this section, key factors that should be considered in the development of a governance model for an advanced traveller information system (ATIS) are introduced. These factors then become the basis for the development and evaluation of various alternatives and the formulation of the final recommendation.

2.2 Background

Advanced Traveller Information Systems (ATIS) are designed to use advanced systems and technologies to manage information and help people decide when to travel and the route to take, as well as provide opportunities to reserve rides, arrange car pools and provide other traveller services. The systems make use of information and communication technologies to deliver information to a wide range of travellers who use different modes of travel and have a wide variety of travel characteristics. Information enables travellers to make better travel choices and supports better use of existing transportation facilities. Such systems have the potential to improve mobility and raise the perceived quality of the traveller's experience through the provision of accurate and timely traveller information.

The vision of the ITS Corporation for the future of ATIS within Greater Vancouver is the deployment of a delivery mechanism that provides traveller information, when and where required. The information provided must be in the appropriate format and be relevant, timely and accurate to effectively support travel decisions for a wide variety of modes. The information is to be available at each stage of the trip (e.g., prior to departure – pre-trip, at departure and during the course of the journey) and in a wide variety of customizable formats, including voice synthesized information bulletins, short messages and sophisticated map-type displays.

Current research in North America has identified four major factors that influence the demand for ATIS services:

- Geographical Regional Traffic Context – The travel attributes of a region, such as road / transit network and capacity, levels of congestion, predictability of travel times and opportunities for diversion to alternate routes or modes impact the level of interest travellers have in receiving or having access to traveller information. Prime ATIS markets appear to be highly congested regions that have limited build-out options, constrained alternate route possibilities and frequent unpredictable traffic events (e.g., weather, crashes).

- Quality of ATIS Services – Traffic information quality determines whether, how frequently, and with what level of confidence the traveller consults traveller information. Quality determines whether the information will meet customer needs with respect to personal benefit and value.

- Individual Trip Characteristics – The trip purpose, the time of the trip in relation to peak congestion periods, trip length, and the particular route or route choices available to the individual traveller all have a significant effect on whether the individual will consult traveller information. To a limited extent, the availability and convenience of alternative mode choices for a given trip affects use of ATIS. Travel time flexibility, or lack thereof, is another determinant in the choice to consult traveller information.

- Characteristics of Traveller – Values and attitude characteristics of the ATIS user, or potential user, are important determinants of user awareness, use patterns, behavioural responses, and evaluation of ATIS.

Market surveys of current customers of ATIS have provided insights into motivations of use. In general, people who have used traveller information services have indicated that they use the information to:

- Assess congestion on their route;
- Judge the effects of incidents on their trip;
- Decide among alternate routes and modes;
- Estimate their trip duration; and
- Time their trip departure.

As a result, the decisions that they make based on the traveller information are:

- Change mode, route or time of departure to improve trip time;
- Change mode, route or time of travel to reduce the stress of travelling in congestion; and
- Adjust their expectations.

The benefits perceived by the users from use of the traveller information include:

- Saved time;
- Avoided congestion;
- Reduced stress; and
- Avoided unsafe conditions.

The common cited complaints, in order of frequency, are as follows:

- Inadequate geographic coverage;
- Inaccurate information;
- Insufficient update frequency;
- Not timely enough; and
- Inadequate spatial resolution.

Based on the research and surveys, the following attributes are considered critical for the provision of ATIS services:

- Adequate geographic coverage;
- Accuracy of information;
- Timeliness of information;
- Reliability of information;
- Cost to use (capital and operating);
- Degree of decision guidance and personalization of information;

- Convenience of access and speed; and
- Safety of operation.

2.3 System

A Regional ATIS and the various processes associated with it can be broken down into three primary functions:

- Assembly of accurate and timely data;
- Processing of the data into information relevant to travellers; and
- Dissemination of the traveller information in a variety of forms and formats to other agencies and the general public.

2.3.1 Data Collection

Data collection is central to the ATIS efforts. Data can be provided to the Regional ATIS by automated monitoring systems (e.g., loops, cameras, probe vehicles, etc.), by visual inspection (e.g., observers in a traffic operations center, patrol vehicles, etc.), and by schedules and other documentation. In broad terms, data types for the provision of ATIS services include:

- Congestion – defined as levels, generally classified by speed;
- Incidents – non-recurring situations;
- Lane / Road Closures – non-recurring and recurring closures;
- Construction – scheduled construction activities, work zones, etc.;
- Speeds – detailed speed data;
- Travel Time – time between two points on the roadway;
- Weather – severe weather warning, rain, snow, temperature;
- Road Surface Conditions – detailed road surface conditions, i.e., dry, wet, snow covered;
- Camera Images – camera image snapshots or full motion video;
- Transit Information – transit routes, transit schedules, fare information, deviations from existing schedules, current transit vehicle locations, etc.;
- Ferry Information – ferry schedules, wait time, fare information, etc.;
- Rail Information – passenger rail services, schedules, fare information, etc.;
- Parking Information – availability, rates, option, status, etc.; and
- Flight Information – flight arrivals and departures.

The assembly of accurate and timely multi-modal and multi-jurisdiction traveller information demands cooperation from a wide diversity of public as well as private sector agencies. Close collaboration with each of the agencies will be required to ensure that they understand the importance and relevance of this information as well as how the consolidated information can ultimately be made available and be of benefit to each. In this respect, the different priorities of the public and the private sector agencies are delineated in Table 2.1. Consensus is required on the data needs and priorities for the Regional ATIS and the best sources of the information to avoid duplication of data collection and encourage participation in ATIS efforts.

TABLE 2.1 : PUBLIC VS PRIVATE SECTOR PRIORITIES			
Public Sector			**Private Sector**
Information Dissemination Priority			
Importance of making available to public			Importance to business
Data Priority			
Freeway Agencies: • Current & scheduled work zones • Incidents • Road conditions • Emergency / evaluation routes and procedures • Weather conditions	Arterial Agencies: • Current & scheduled work zones • Incidents • Route designation • Emergency / evaluation routes and procedures • Road conditions	Transit Agencies: • Vehicle time & location • Information that affects customer service	• Traffic speeds • Incidents • Road conditions • Current and scheduled work zones • Weather conditions

Standardization of data collection is also a key consideration in reducing the cost of manipulating, storing and reporting the information contained in the data. Data standards that affect ATIS services include:

- Types of data provided;
- Representation of data;
- Quality control checks;
- Update frequency; and
- Geographic area.

2.3.2 *Data Fusion*

Data fusion is the process of taking raw data from the data collection process, and converting them into relevant traveller information for dissemination purposes. The fusion process can include such functions as:

- Combining Data – matching data from difference sources, comparing and selecting the better measure of conditions;
- Performing Quality Control Checks – ensuring the validity of the data reported; and
- Adding Value – computing new variables from collected data (e.g., speed, transit arrival time, travel time, traffic volume forecast, etc.), converting data from one format to another, and compiling data from multiple sources into a single data feed.

The data fusion process can take place in one or many steps. It can be done as the last step in the data collection process, as part of a central database function, or as part of the value-added service. The value-added services may be performed by the agency that collects the initial raw data, by an information disseminator, or by a third party that collects data from one or more sources, adds value to it, and provides it to an information service provider.

Where the data fusion process is performed by the public sector agencies, the consolidated data or traveller information is typically passed along to both public and private entities free of charge. In the case of the private sector agencies, the consolidated data will typically be distributed on a fee basis.

2.3.3 *Information Dissemination*

The dissemination of the consolidated and formatted traveller information can be through the media, or directly to travellers via kiosks, dynamic message signs or traveller access devices through the use of Internet, personal digital assistants, phone, email, pagers, in-vehicle devices, etc. The Internet is seen as the most effective means of information dissemination since it maximizes the use of existing infrastructure and through the development of a web portal, allows the information within the central traveller information system to be widely distributed at minimal cost. The Internet then becomes the "vehicle" for other agencies to access the information and distribute as they see fit. Alternatively, dissemination can be through a variety of personal or in-vehicle devices by transmitting message packages over a wireless communications network.

As with data collection and data fusion, dissemination of traveller information can be performed by public or private sector agencies, or a combination of both. In recent ATIS efforts in North America the responsibility for information dissemination has been split between the public and the private sectors. Typically the public sector tends to control information dissemination via roadside / fleet infrastructure such as variable message signs, highway advisory radio and transit information systems. The private sector tends to be involved in more broadly based devices through commercial media broadcasts as well as the use of various personal communications devices to which traffic condition and transit system information can be broadcast.

2.3.4 *Database Management*

With the Regional ATIS serving as a central repository, the database will have to be administered and maintained by an entity to ensure that the necessary information is collected, verified for accuracy and input into the database. The database can be managed solely by the entity or on a partnership basis in conjunction with information service providers involved in the dissemination of the traveller information.

2.4 Institutional

To date, ATIS for the Greater Vancouver area is not coordinated nor integrated amongst agencies. The development of the Regional ATIS will require a partnership arrangement that takes into account how each of these agencies currently undertakes their daily duties and how traveller information can be collected as quickly and efficiently as possible without unduly impacting each agency's policies, procedures and manpower requirements.

2.4.1 *Hosting of the Regional ATIS*

A Regional ATIS must provide continuous operation on a 24-hour-day and 7-day-week basis. To provide this level of service, the Regional ATIS can either be embedded within TransLink's existing architecture and web server as a subordinate or operate as a standalone system. It is suggested that to maximize utilization the Regional ATIS should be a standalone system, with close links to the TransLink site. The standalone Regional ATIS would be more direct to the users and carry its own identity for public recognition. The hosting of the Regional ATIS, in terms of the web site and the database management, can be by TransLink or a separate entity depending on the institutional framework, or be contracted to a third party.

2.4.2 Branding / Marketing

With the priority of the public sector agencies in making information available to the public, traveller information must be provided by means of no- or low-cost service to end users so that price is not a barrier to its use. This policy would create conflict in ensuring cost recovery to promote investment. The alternative, or the compromised solution, would be to price according to willingness to pay by means of branding. In this respect, pre-trip planning information may be considered as basic services to be offered for free or at very low cost. Other traveller services information, en-route driver information, route guidance, ride matching and reservation can be considered as value-added services and are to be branded so as to warrant pricing according to what people are willing to pay.

2.4.3 Ownership of Data

The governance body of the Regional ATIS will have the moral right to ownership of the end product. As such, they would own the asset including the data and the intellectual property. This ownership by public sector agencies allows the public sector to gain the maximum possible use of the data to achieve public policy goals and priorities (e.g., wide dissemination of the data to maximize safety and the efficient use of the transportation network). On the other hand, the granting of ownership to the private sector would create the opportunity for the private sector to innovate, increase the market and revenue generation potential and help build and expand the ATIS and strive to make it self sufficient. Often these two approaches present a quandary to the public sector agencies who wish to make traveller information self sufficient and yet strive to meet their public agency goal of maximizing the safety and efficiency of their transportation network. The form of the governance body, as well as the ownership and control of data, will therefore have to be clearly established in conjunction with the role and priorities of the public sector agencies and the level of competition to be allowed so that the market can successfully reach a critical mass.

2.5 Financial

To date, commercial activity in traveller information has been dominated by the broadcast of traffic reports using a "barter" arrangement. The service provider collects and processes traffic data and generates traffic information bulletins. The bulletins are then offered for "sale". In the case of commercial broadcast radio, the bulletins are broadcast ready and offered in exchange for air time, which is then sold by the service provider in the form of advertising. In the case of a cellular telephone company or other service provider, the bulletins are provided along with advertising banners or sold on a subscription basis to cell phone users.

Since the ATIS market is still maturing and it is not known what will be its ultimate size or worth, business models for delivery of payment for ATIS services are still in flux. The issue to be addressed is how much the public are prepared to pay for the service, which in turn directly impacts the ability of the service providers to pay for the data that is available from the public sector.

Over the past ten years, many traveller information pilot projects have been implemented in North America quite successfully, with the intention of gradually reducing the public subsidy as the user base increased. However to date, none of them have managed to become financially independent with many of the initiatives failing due to lack of revenue. Examples of such initiatives in North America include four projects that were deployed in the mid 1990's as part of

the Model Deployment Initiatives in the United States (Phoenix, San Antonio, Seattle and New York). While some of these initiatives have generated revenue, the amount is no where close to making these operations self-sufficient. The only exception is Westwood One (a media conglomerate that has purchased SmartRoute Systems, Shadow Traffic and Metro Networks) that have made a successful business enterprise of collecting traffic information and preparing "broadcast ready" radio traffic reports. Westwood's success is based on their ability to maximize the number of radio stations and the traffic information provided with a minimum investment in surveillance and processing equipment.

In Europe and the UK, Trafficmaster is the one service provider that has made significant progress in developing a business in providing traveller information. Founded in 1989, Trafficmaster is an established UK technology company, focusing on satellite navigation and digital traffic information. Traffic information is derived from a state-of-the-art network of nationwide sensors and transmitters that gather and distribute traffic data of over 8,000 miles of motorway and trunk routes. Designed, developed and patented by Trafficmaster, the system disseminates the gathered data at the company's headquarters at Cranfield in Bedfordshire to the customer through a number of screen or speech-based receivers. These include a variety of in-car products and services that include Smartnav, Trafficmaster Monitor, YQ², Oracle and Freeway units. Traffic information from Trafficmaster can be obtained by phoning the 1740 service, which is run in partnership with the Royal Automobile Club and UK's main mobile phone operators. It is also available on their web site (www.trafficmaster.net), which provides live traffic information on personal computers at home or in the office. Along with Smartnav, its flagship satellite navigation product and its existing sensor network, Trafficmaster provides its customers with a range of products of a quality unsurpassed by its competitors.

To date, the business enterprises that have been the most successful in generating revenues from traveller information are those that package the information with other services such as personal security, yellow pages information, weather information, stocks, navigation, etc. An example of this is General Motors "On Star" service where vehicles are equipped with a GPS transmitter and a cell phone. Monthly subscriptions are sold to automatically dispatch emergency vehicles when an airbag is deployed, locate a vehicle when it is stolen or provide directions and yellow page services through an operator. It is possible that real-time information on traffic conditions, road surface conditions, incident locations, lane closures, etc. would provide an enhanced level of service to the traveller, however it is unknown how much (if anything) consumers would be willing to pay for the enhanced service.

In conclusion, in the near term, government funding will still be necessary to deploy and operate ATIS. But in the foreseeable future, it is anticipated that a market would be developed for this service whereby revenue would be secured generally from advertising (e.g., on a web site), subscriptions (e.g., for customized information services), and sponsorships (e.g., for ongoing financial contributions). It is expected that revenue would increase over time with corresponding reductions in public sector financial support to the point where the revenues would sustain the system. Revenue sharing between the public and private sector partners is also seen as an option. The prospect of revenue capture is however limited by the following factors:

- Area of coverage in terms of transport modes and jurisdictions covered in the database;
- Quality of information in terms of reliability, accuracy, availability of real-time data, data gaps, data format, user friendliness and ease of accessibility;
- Public expectation of accessing information for free;
- Availability of "free" and "live" information through radio and television; and
- Predictability of urban traffic conditions and thus reservation on added value of the information.

3. INSTITUTIONAL FRAMEWORK

3.1 Attributes

3.1.1 Role of ATIS

With the discussion under Section 2.4.3 on ownership of data, one of the key determinants on the development of the institutional framework for the Regional ATIS is the decision on whether the ATIS is to be public policy driven or market driven. Both of these approaches, which are not mutually exclusive, are considered to be reasonable and realistic, but require different business models and partnership relationships. The public policy oriented ATIS will require significantly more financial and managerial input from the public sector agencies, while the market oriented approach is more focused on value-added services for which end users are willing to pay.

3.1.2 Leadership

In practice, two leadership roles are required for the provision of ATIS services. One is the public sector leader who will be the primary facilitator of the public sector agency ATIS efforts. The other is the lead ATIS operator who will be in charge of the day-to-day implementation and operation of the overall ATIS efforts.

The public sector leader provides the contracting mechanism, defines problems and assembles the resources that others in the public and private sectors use for the provision of the ATIS services. The selected lead agency must have the mandate, in terms of financial, legal and political aspects, to undertake this ATIS role.

The lead ATIS operator can be filled by either the public or private sector. The selection of the appropriate ATIS operator and the business relationship involves balancing the financial means and technical capabilities of the various public sector agencies, their interest in performing this role, the level of interest in ATIS from the private sector, the sustainability of the business, legal constraints for public / private contracting relationships, and the political issue affecting public transportation decisions. Successful ATIS efforts have operated under the direction of both public agencies and the private sector.

3.1.3 Roles and Responsibilities of Participants

As the basic functions of the ATIS described under Section 2.3 can be performed by either the public or private sector agencies, it is important to involve all potential participants in the ATIS efforts as early as possible. The selection of participants is more of an "inclusive" rather than "exclusive" process based on the criteria of value added. In recognition of the differing goals, objectives and priorities of the public and private sector agencies, a decision-making mechanism is required to account for these differences and to establish open communication channels for addressing and resolving them. Based on the mutual understanding and the consensus achieved, the roles and responsibilities for each of the selected participants must be clearly defined. All the participants must agree on the course of action that needs to the taken, and each should ensure that they have the resources and capability, as well as the commitment, to perform the functions required of them.

3.1.4 *Coordination among Participants*

Notwithstanding the differences in the goals, objectives and priorities of the various participants, which can be resolved by clearly defined roles and expectations, the level of coordination that will be required is not to be underestimated. A management structure and a coordination mechanism, with the commitment to work together, are required to resolve conflicts as they arise, particularly those among public sector participants and crossing jurisdictional boundaries. The coordination efforts among all the participants will have the benefit of:

- Harmonization amongst jurisdictions;
- Cost saving from less duplication of efforts;
- Cost saving from joint procurement;
- Effective utilization of skilled resources; and
- Compatibility in data format.

3.1.5 *Infrastructure*

The availability of infrastructure and the value of associated data that can be generated and shared, or the lack of it, is a key factor in determining the types of ATIS services that can be offered, the inability to attract the interest of the private sector, as well as the selection of the appropriate business relationships.

3.1.6 *Revenue Needs and Sources*

The potential for revenue generation from traveller information is controlled primarily by the size of the ATIS market and the availability of accurate and timely traffic data over a wide geographic area. As a result of the current inadequacy of geographic coverage, frequency, availability and quality of traffic data, significant revenue is unlikely to be generated anytime soon. The lack of national standards to ensure interoperability also hinders the maturity of the ATIS market.

Revenue is not necessary to be generated in the form of cash payment. The barter arrangement has generally been adopted for broadcast information. Other than the barter basis, certain ATIS services are currently supplied on a subscription basis and require end users to own specific electronic devices. The sustainability of such a fee for service initiative would however not be forthcoming until such devices are more commonly available, and are coupled with multi-service information and/or availability of national data

3.1.7 *Legal and Administrative Issues*

As mentioned under Section 3.1.2, the selected lead agency must have the mandate, in terms of financial, legal and political aspects, to undertake a leadership role. Related issues would include the legality of the contemplated business relationships with the private sector agencies, implication of revenue generation and how the revenue is allocated, ownership / intellectual property rights, and the granting of access of publicly collected data to the private sector (either on an exclusive or non-exclusive basis).

3.1.8 Public-Private Partnerships

With due consideration on the above attributes, the business relationships contemplated between the public and private sector agencies need to be structured appropriately. In recognition of the immaturity of the existing ATIS market and the need for changes in priorities over time to reflect the evolving market as well as the availability of new data sources and means of dissemination, the structure to be formulated will have to be flexible enough to be able to account for and accommodate any required changes. A mechanism needs to be in place for such review and decision making process. The inclusion of appropriate escape clauses would allow participants to terminate the business relationship as warranted, while the sunset clauses would facilitate the removal of any exclusivity rights as the market reaches its critical mass.

3.2 Experience in Other Jurisdictions

In Canada, the deployment of ATIS to date has been limited to traffic, road and transit information, the deployment of which are mainly public initiatives with some contracting with the private sector for provision of services.

Notable example is the COMPASS Freeway Traffic Management System operated by the Ministry of Transportation of Ontario (MTO) where traffic and incident information on Highway 401 in Toronto, Burlington Skyway, and Queen Elizabeth Highway are disseminated via changeable message signs, with live camera images available on the MTO web site. In addition, an automated information distribution system, the Traffic and Road Information System (TRIS), has been implemented to provide traffic reports for provincially maintained highways in the Greater Toronto Area and the Niagara Peninsula regions. TRIS traffic reports are available to the motoring public via the MTO web site, and to subscribers via fax (primarily radio media). For the City of Toronto, the Road Emergency Services Communications Unit (RESCU) has been in place since 1994. The RESCU traffic management system provides traffic information along the road corridor composed of the Gardiner Expressway, Lake Shore Boulevard, and part of the Don Valley Parkway up to the Don Mills Road Interchange. RESCU images and information are available on the City's web site, and via automated fax services conveying up-to-date traffic information to subscribers, as well as a 24-hour voice information system (RoadInfo) for road construction information. In respect of transit information, on-line trip planning has been successfully implemented by TransLink and Winnipeg Transit.

In the United States, since the inception of the Federal ITS program in 1991 and the request by the U.S. Department of Transportation (DOT) for participation in the ITS Metropolitan Model Deployment Initiative (MMDI), Phoenix, San Antonio, Seattle, and New York / New Jersey / Connecticut areas have been selected as the four model deployment sites in 1996 to showcase the benefits and cost-effectiveness of a metropolitan ITS infrastructure.

For the four MMDI initiatives, both the public and private sectors have converged on a public-private partnership business model for ATIS. In these partnerships, the public sector agency provides the start-up funds including some capital investment and the private sector provides capital investment for ancillary systems and in some cases field equipment (e.g., cameras) as well as operate and maintain the system. In some cases, the private sector also operates a traffic management centre. An ATIS system commonly consists of a means of digitally converging traffic and incident data, creating information relevant to the traveller and relaying this information in graphic, text and video form to users. Typically information is conveyed free of charge to the public, using the Internet and telephone as the primary method of dissemination. Where

contracts are arranged with the media, information is also conveyed through radio and television and in some cases the press. It was anticipated that a market would be developed for a traveller information service whereby revenue would be secured from advertising (say on a web site), subscriptions (for customized information services), and sponsorships (for ongoing financial contributions). It was also expected that revenue would increase over time with corresponding reductions in public sector financial support to the point where the revenues would sustain the system. Revenue sharing between the public and private sector partners was also seen as an option. A number of contracts have been secured based on this model although there are significant variations in detail between locations. To date, revenue expectations under this business model have not materialized raising concern over its viability.

The experience in Canada and the United States with respect to traveller information partnerships, the various arrangements, roles and responsibilities and experience to date is summarized in Table 3.1. The observations are discussed in the following subsections.

3.2.1 Revenue Capture

Revenue capture by public sector agencies through revenue sharing with the private sector or other means is either nil or relatively minor. Even where there is some revenue, it has resulted from sizable public sector investment. This underscores the reality that most public and private sector organizations have now accepted, which is that market prospects for the sale of travel information are limited at this time. The reasons cited for this are mainly:

- The quality of the information is poor in terms of limited system scope (only expressways), data gaps and not real-time, which is exacerbated by multi-jurisdictional responsibility in specific urban areas;
- Public expectations that information should be free;
- Questions in the minds of the public about the added value of the information, given the predictability of urban traffic conditions and the resigned attitude of the public toward the reality and inevitability of congestion; and
- Availability of "free" and "live" information over radio stations (even though the quality of information conveyed is questionable to many of those interviewed).

In this regard, it should be noted that there appears to be public sector institutional attitudes and practices that limit prospects for revenue capture. This is due to the fact that revenue prospects have never been a priority, largely because of the expectation that the public view, and therefore the political response, is that the information should be free. Also, public officials generally believe that their primary responsibility and objective is to maximize the dissemination of information, not to make money. Moreover, in many cases, even if there were some interest in seeking revenue, it would be allocated to a consolidated government revenue fund thereby deterring any incentive for the transportation agency.

3.2.2 Cost Avoidance

Some arrangements with private companies have resulted in private sector investments in systems and field equipment (CCTV cameras) that benefit the overall ITS program in a particular area. However, it should be noted that the private sector contribution is often the minor share relative to the public sector investments. Furthermore, private contributions have been made with the expectation of substantial revenues, which have not materialized.

3.2.3 *Quality and Use of ATIS*

The quality of the information systems varies significantly. Some web sites are more user friendly than others, most contain links to transit information systems, but the "buttons' are more obscure in some compared to others, some web sites have camera images but many do not, some web sites have a convenient graphic system performance map while others only have textural information for each link in the system. The quality depends on the extent of investment, which is clearly evident to the user.

The propensity to use traffic information systems was also much higher in those areas that experience severe congestion (such as Seattle). There is also evidence that access to the systems is greater during the afternoon peak period.

Notwithstanding the lack of overall success with revenue generation, there continues to be public sector interest in the development of ATIS. Fundamental to the development and utilization of ATIS, from both the government and the users' point of view, is the extent and quality of the data collected through ITS systems and other means of detection. This is directly dependent on the maturity and extent of application of the detection systems, as well as the quality of the data fusion. With the rapid development of mobile devices for the consumer, filling this gap in traffic data is becoming increasingly important.

Of course, to generate the necessary information in a format that is user friendly requires a substantial investment and there are a number of challenges associated with obtaining funding for these endeavours, especially since they have been typically undertaken as a later and separate stage in an ITS deployment program. Disseminating information to the public is vital to fulfilling the fundamental objectives of ITS, which suggest that ITS projects should include the ATIS component as an integral part of a funded ITS program at the outset.

3.2.4 *"511" Telephone Number*

Most jurisdictions are now in the preliminary stages of assessing the role and impact of the new "511" telephone access number for transportation and weather information, which has been designated for use as the national travel information number across the U.S by the Federal Communications Commission (FCC) in July 2000. In this regard, U.S. DOT is examining what effect this could have on new business models for the development and maintenance of ATIS Systems, and therefore options for the government's role related thereto.

3.2.5 *Lessons Learned*

The lessons learned from the experience of the other jurisdictions include:

- Provide the end users with a needed service;
- Build on existing relationships;
- Encourage private sector participation;
- Develop the management structure;
- Define explicit roles and responsibilities;
- Select the appropriate procurement mechanisms and streamline the process;
- Assign intellectual property rights fairly;
- Address the ownership, use, and distribution of data and information;
- Develop policies that govern operations; and

- Plan for future expansion.

3.3 Options

Currently within the Greater Vancouver Area, individual public and private sector agencies are responsible for specific subsets of the transportation system such as highways, municipal roads, transit, airports, ports, ferries, etc., as well as for the operation of fleets and provision of transportation services. Each agency has primary or sole decision making authority over the infrastructure and/or services within their jurisdiction.

The institutional framework for the Regional ATIS must help the agencies involved deal with issues such as inter-agency coordination, cost sharing, legislative and legal issues, while maintaining public and political awareness. Cooperative approaches can also help address technical issues such as developing and adopting standards providing training and efficiently operating systems. The options for an institutional framework are discussed in the following subsections.

3.3.1 Public Agency Framework

Based on the findings in the Final Report of the British Columbia's Provincial ITS Vision and Strategic Plan, November 2001, the potential options for public agency business relationships that could be considered for cooperative planning and deployment of the Regional ATIS include:

- Expansion of the ITS Corporation – Expansion of the existing ITS Corporation to include areas outside of the Lower Mainland, with the addition of potential ATIS participants such as BC Transit, other municipalities, and other airports and ports to the board of the corporation. The primary issue with this option is whether Translink has the interest or mandate to extend the ITS Corporation beyond the Lower Mainland area. It may also be in the business interests of the ITS Corporation to maintain its focus on the Lower Mainland area.

- New Regional ATIS Coordinating Body – Establishment of a new regional entity with representation from potential ATIS participants, similar in concept to the ITS Corporation, i.e., a voluntary, cooperative organization.

Other than the establishment of a governance body, public agency relationships can be achieved by means of inter-agency agreements stipulating the services to be provided by one public agency to another public agency. These types of agreements allow the public sector to provide services that would not otherwise be available and allows the agencies to provide the services at a lower cost, or to pool resources among agencies to achieve a particular capability.

Under the public agency framework, the participating public sector agencies own, design, construct, operate and maintain the system, i.e., they take up the dual role as the lead agency and the lead ATIS operator. Under this arrangement, the ATIS services would provided at no- or low-cost with public funding acting as the primary source with some potential for revenue generation to offset capital and operating costs.

3.3.2 *Public-Private Partnership*

With the objective of formulating a cooperative structure, the options for public-private partnership that could be considered to accomplish both mutual and individual goals include:

- Functional Division of Responsibility – Assignment of functional responsibilities among public and private participants by means of a competitive bid and/or negotiated settlement. Under this option, there would be shared ownership, design, construction, operation and maintenance of the system, with the public sector agency responsible for managing the bidding / negotiation process to select partners and establish their roles. The specific business arrangements that support these functional roles would vary according to the function and group. The advantage of this approach is that each participant can focus on their respective strengths. The disadvantage is the legal issues involved with selecting partners and establishing the roles and responsibilities in an equitable manner that allows these functional relationships to take place, particularly in respect of revenue allocation.

- Public-Private Consortium – Establishment of a public-private company or organization under the direction of a board comprised of representatives from both the public and private sectors and managed as a non-profit agency or corporation. The non-profit agency can contract for services, and accept revenue, without the contracting constraints that apply to the public sector. Under this approach, the public sector agency would act as the lead agency to oversee the creating of the non-profit company, with either the public or the private sector agency acting as the lead ATIS operator. While the ownership of most of the system components remains with the public sector, responsibility for the design, construction, operational and maintenance functions would be shared between the public and private sectors. With the board structure, this approach tends to foster inter-agency cooperation, and meets a combination of both public and private sector needs. The disadvantage is the impact that any disagreement between the private and the pubic sector members of the board on the direction of the non-profit company may have on the performance of the company.

- Cost Sharing – Sharing of the financial burden between the public and private sectors in supplying services to the end users, in the form of direct or indirect payments in cash or in-kind services. Depending on the specific arrangements, payments made by the users of the Regional ATIS can be applied to capital costs, operating costs, or both. While the public sector would be the lead agency, both the public and the private sectors can be assigned as the lead ATIS operator, with responsibility for ownership, design, construction, operational and maintenance functions shared between sectors. The advantage of this approach is that the public and private sectors can leverage one another to make some of the more risk prone business undertakings more feasible. The disadvantage is the ability to establish ownership / intellectual property rights to the traffic data. This option also assumes that the Regional ATIS will either be self sufficient or capable of providing revenue-generating potential sufficient to offset the costs.

3.3.3 *Contracting for Services*

The options on the traditional means of service procurement include:

- Service Contracts – Private sector service providers bid on the performance of tasks and/or implementation of the Regional ATIS as defined by the public sector agency in the

form of low-bid contracting, life cycle contracting or performance contracting, with the option for fixed price, cost plus fixed fee, cost plus award fee and other alternatives. The advantage of this form of contracting is that the public sector agency is able to obtain specialized skills that it may lack in its own work force and that costs are optimized due to the competitive bidding process. The disadvantage is the requirement for public sector agency oversight to monitor the contracting process and the performance of the contractor. The approach also does not offer any incentive for the private sector to provide more efficient services once the contract has been awarded.

- Public Turnkey – Private sector service providers bid for design and build (with public operation and maintenance), design, build and maintain (with public operation), or design, build, operate and maintain for the implementation of a Regional ATIS as defined by the public sector agency. Under this approach, the public sector may use private financing to fund the initial implementation and operation of the system. Other than the private financing, the advantage of the turnkey approach is that the private sector may have a better understanding of the issues and be better positioned to work across jurisdictional boundaries than the public sector. The disadvantage is the creation of a monopoly and establishing ownership / intellectual property rights to the traffic data.

- Public-Private Competition – Similar to the service contracts approach described above, except in this case both public and private sector service providers compete with one another on various implementation, maintenance and operational tasks associated with the Regional ATIS as defined by the public sector agency. The advantage of this approach is increased competition resulting in more efficient and cost-effective services. The disadvantage comes from the difficulties associated with creating fair competition between the public and private sectors.

3.4 Recommendation

With the ATIS field evolving so rapidly, the institutional framework is likely to evolve over time, New and different public and private relationships will become apparent as the market size and revenue potential for the services become clearer. For this reason, the recommended institutional framework for Regional ATIS within the Greater Vancouver area is based on providing the most effective means of implementing and managing traveller information while providing flexibility for the future developments. The recommended approach is also one that fits within current institutional boundaries without requiring any significant deviation from existing policies or procedures or need for legislative changes. As a result the recommended framework is based on the Public Agency Framework option described previously.

With the ITS Corporation being a multi-agency organization with multi-modal interests across jurisdictions, it provides the necessary institutional framework to be the governance body of the Regional ATIS. Depending on the mandate of the ITS Corporation in terms of ownership and operations, it may be prudent for a separate entity governed by the ITS Corporation to be set up. This new entity, which can be expanded from the existing ITS Corporation to include other agencies, would then operate and maintain the Regional ATIS, taking responsibility for such tasks as data collection, data fusion, packaging and database management. Under this arrangement, it is assumed that the private sector would then take the initiative to provide a variety of additional value-added and customized services.

The establishment of a separate entity would have the added benefit of ensuring that the participating public agencies are aware of the system elements envisioned, the technologies

involved, its applications and the associated benefits so that potential applications are considered in the planning and design of all infrastructure projects. Even if system elements are not required until some point in the future, provisions included in the planning and design of infrastructure projects could significantly reduce implementation costs when the needs do arise.

With the intent for the Regional ATIS to be self-sustaining and self-funding while fostering public and market acceptance, it is suggested that for Phase 1 implementation of the Regional ATIS using the Internet as the dissemination medium, general traveller information be provided free of charge. With sufficient site visitation, it is expected that advertising revenue would assist in sustaining the operation and maintenance of the web site. Based on the standalone web site concept as recommended under the governance framework, there would be greater opportunity for specialized advertisers, who could also assist in marketing the web site as well as provide revenue. Consideration could also be given to charging television stations annual fees for access to CCTV camera images.

As mentioned in the above discussion, the provision of additional customized or value-added services is the responsibility of the private sector, which would be offered, based on a fee for service basis. The policy issue that will need to be addressed is whether or not the private sector is charged a fee for access to the traffic data. If a fee is charged either on a straight fee basis or as part of a partnership arrangement, the revenue generated can be used to offset capital or operating costs of the Regional ATIS. The charging for traffic data however can be considered as working against the overall goal of making accurate and timely traveller information easily accessible and as widely disseminated as possible. Regardless, any revenue generated and captured by the public agency should only be utilized for the purposes of operating and maintaining the Regional ATIS, as well as for its future expansion and enhancement.

In recognition of the current level of activities in British Columbia, in particular the investments planned to be in place for the 2010 Winter Olympics and the sustainability theme of the Olympics itself; the above recommendation on Public Agency Framework is suited for the Phase 1 and perhaps Phase 2 implementation of the Regional ATIS. The economic momentum building up to the 2010 Olympics will no doubt drive the need for increased geographic coverage as well as the marketability of personalized devices / technologies in enhancing the business case of the Regional ATIS and in attracting the interests of the private sector. The institutional framework for the subsequent phases could therefore vary significantly with the increased role of the private sector and the addition of users, targets and tools.

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
Canada				
Trip Planning on the Web, Calgary (in progress)	• Public – Calgary Transit	• Public – Calgary Transit	• Public – Calgary Transit via web site	• RFP for partner consulting agency currently outstanding
Real-time Traffic Information, Calgary (in progress)	• Public – Calgary Transit, Calgary Police Service, Fleet Services, Calgary Fire Department, and others including the public	• Public – Centralized data fusion agency to be determined	• Public – Centralized operating agency to be determined	• No partner consulting agency reported
Video Traffic Management and Traveller Information, Edmonton (in progress)	• Public – City of Edmonton	• Public – City of Edmonton	• Public – City of Edmonton via web site	• Partner consulting agency – IBI Engineering
ATIS at Hwy 99/I5 Border Crossing, Greater Vancouver / Surrey (in progress)	• Public – BC Ministry of Transportation	• Public – BC Ministry of Transportation	• Public – BC Ministry of Transportation	• Partner consulting agency – IBI Consulting Group, PBA Engineering
Transit Trip Planning, TransLink, Greater Vancouver Area	• Public - TransLink	• Public – TransLink	• Public – TransLink web site (www.tripplanning.translink.bc.ca)	• No partner consulting agency reported
Winnipeg Transit On Line Trip Planner, Navigo, Winnipeg	• Public – Winnipeg Transit	• Public – Winnipeg Transit	• Public – Winnipeg Transit web site (www.winnipegtransit.com/main)	• No partner consulting agency reported
RESCU, Road Emergency Services Communications Unit / RTIS, Remote Traffic Information System / RoadInfo, Toronto	• Public – City of Toronto	• Public – City of Toronto	• Public – City of Toronto web site (www.city.toronto.on.ca/rescu), CMS • Private – through contractor via 24-hour voice information system (RoadInfo) and automated fax services (Autofax) to subscribers	• Partner consulting agency – IBI Group, Delcan Corporation • City policy to be followed for revenue generation to offset the City of Toronto's cost of providing ATIS services

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
TRIS, Traffic & Road Information System, Golden Horseshoe Area	• Public – Ministry of Transportation of Ontario through COMPASS System	• Public – Ministry of Transportation of Ontario	• Public – Ministry of Transportation of Ontario web site (www.mto.gov.on.ca/english/traveller/compass/camera/pictures/tris), fax (primary radio media) to subscribers	• Partner consulting agency – Delcan Corporation
MTO Info Enquiry Line, Ontario Province	• Public – Ministry of Transportation of Ontario through COMPASS System	• Public – Ministry of Transportation of Ontario	• Public – Ministry of Transportation of Ontario web site (www.mto.gov.on.ca), phone line (1-800-268-4686)	• No partner consulting agency reported
D.R.I.V.E.S, Real-Time Traffic Information Service, Toronto, Montreal, other cities to follow	• Private – Globis Data Inc.	• Private – Globis Data Inc.	• Private – Globis Data Inc. web site (www.drivestoronto.ca, www.drivesmontreal.ca)	• Private initiative
Travaux Routiers, Road Work Information System, Québec	• Public – Ministère des Transports du Québec	• Public – Ministère des Transports du Québec	• Public – Ministère des Transports du Québec web site (www.mtq.gouv.qc.ca/travaux), phone line and other sources	• No partner consulting agency reported
Detection System for Waiting Queue Length at the St. Bernard de Lacolle Customs Bureau, Québec	• Public – Ministère des Transports du Québec	• Public – Ministère des Transports du Québec	• Public – Ministère des Transports du Québec web site (www.mtq.gouv.qc.ca/cameras/quebec)	• No partner consulting agency reported
Conditions Routières, Roadway Condition Information System, Québec	• Public – Ministère des Transports du Québec	• Public – Ministère des Transports du Québec	• Public – Ministère des Transports du Québec web site (www.mtq.gouv.qc.ca/etat_routes/)	• No partner consulting agency reported
United States				

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
Seattle Metropolitan Model Deployment Initiative (MMDI)	• Public – Washington State DOT	• Public-Private Partnership – Smart Trek – led by Washington State DOT in cooperation with the Federal Highway Administration (FHWA) and Federal Transit Administration	• Public – Washington State DOT traffic web site (www.wsdot.wa.gov/PugetSoundTraffic), Smart Trek web site (www.smarttrek.org), King County Metro Online transit web site (transit.metrokc.gov), King County Transit Watch video monitors • Private – Traffic TV to subscribers of AT&T cable services in King County, Fastline personal travel companion (PTC) (www.Fastline.com) • Private – ETAK / Metro Networks real-time traveller information web site (www.autotraffic.com)	• Public-Private Partnership – Smart Trek – between 11 public agencies and 10 private companies based on a sole-source procurement method to contract with the private sector firms • Smart Trek developed with fee for service contractors • Maintenance costs of the web sites partially offset by revenue from web site advertising, with potential increase in revenue if the Washington State DOT and the Smart Trek web sites are to be combined • Fastline has no market penetration
Phoenix MMDI	• Public – Arizona DOT and Maricopa County DOT	• Public-Private Partnership – AZTech – led by Arizona DOT and Maricopa County DOT in cooperation with FHWA, Arizona Department of Public Safety and various municipalities, with primary private sector participants being TRW and ETAK	• Regional Multimodal Traveller Information (RMTI) via internet, kiosk, pager, etc. • Public – Arizona DOT web site (www.azfms.com), Touch Arizona kiosks, voice-response public remote access system, Arizona 511 travel information system • Private – ETAK web site (www.etaktraffic.com/phoenix), TrafficCheck cable television channel in Tempe area, travel advisory news network (TANN), personalized traffic reports transmitted via pager, palm-top computer, email, fax or digital cell phone, in-vehicle navigation system	• Public-Private Partnership – AZTech – between 5 public agencies and 16 private companies • One of the world's first privatized Advanced Traveller Information Systems

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
San Antonio MMDI	• Public – Texas DOT	• Public-Private Partnership – TransGuide – led by Texas DOT, City of San Antonio and VIA Metropolitan Transit	• Regional Multimodal Traveller Information (RMTI) via internet, kiosk, pager, etc. • Public – TransGuide web site (www.transguide.dot.state.tx.us), low power television station (UHF Channel 54 and Cable Channel 21), in-vehicle navigation system	• Public-Private Partnership – TransGuide – between 7 public agencies and 7 private companies • Information sharing agreement with private sector for data / video distribution
Minnesota Guidestar	• Public – Minnesota DOT	• Public-Private Partnership - Guidestar	• Public – Guidestar web site (www.dot.state.mn.us/guidestar), 511 telephone information service, cable TV (Avrig and Sjoberg) • Private – Minneapolis Star Tribune web site (www.startribune.com/news/traffic/cgi)	• Public-Private Partnership – Guidestar – led by Minnesota DOT in partnership with FHWA, University of Minnesota, numerous other public and private partners, and ITS Minnesota
San Francisco Bay Area TravInfo	• Public – Metropolitan Transportation Commission (MTC)	• Public-Private Partnership - TravInfo	• Public – TravInfo web site (www.travinfo.org), 511 toll-free phone and web service • Private – ETAK / Metro Networks real-time traveller information web site (www.autotraffic.com)	• Public-Private Partnership – TravInfo – a flexible partnership led by MTC under a management board including Caltrans, CHP, FHWA, Federal Transit Administration, California Partners for Advanced Transit and Highways (PATH), University of California, with currently 53 private companies registered to participate • Public funding with in-kind contribution from project participants • PB Farradyne under contract to MTC on fee for service with no exclusive access to traffic information, but option for revenue capture and sharing at later stage

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
Washington D.C. Partners in Motion	Public – Virginia DOT Private – SmartRoute for CCTV cameras	• Private - Battelle Memorial Institute as system integrator with SmartRoute operating the SmarTraveler® Information Center in Washington, D.C.	• Public – Virginia DOT web site (www.virginiadot.org), television, VMS, in-vehicle device, 511virginia real-time traffic / traveller / tourist information service (www.511virginia.org) • Private – SmartRoute web site (www.smartroute.com) (Washington D.C. traffic no longer featured on SmartRoute web site at time of writing)	• Public-Private Partnership – led by Virginia DOT with Maryland DOT, District of Columbia, five counties, and several cities, as well as federal government and regional authorities, a coalition of 26 public agencies on strict voluntary basis • With 26 public and 13 private partners, Partners In Motion is the largest public-private partnership, and one of the most privately oriented projects, merging public and private resources in respect of finance, data and operations • Agreement with SmartRoute involved revenue sharing, but fallen far short of expectations due to low market penetration, agreement also non-exclusive with others, such as Eyecast, having access to Virginia DOT's cameras
Philadelphia and Pittsburgh Areas	• Public – Pennsylvania DOT • Private – Digital Traffic Pulse network of sensors	• Private – Traffic Pulse	• Private – Traffic Pulse web site (www.traffic.com)	• Public-Private Partnership – between Pennsylvania DOT and Traffic.com • Revenue sharing based on percentage of gross revenue • Traffic.com contracted with radio and television stations

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
South California Priority Corridor TANN	• Public – Southern California Association of Governments	• Private – through TANN (Traveller Advisory News Network)	• Public – TANN web site (www.tann.com) providing real-time traffic network, transit trip planning and ride share matching systems, VMS, HAR, cable TV	• Public Agency Framework – TANN – led by Southern California Association of Governments representing six counties and South Coast Air Quality Management District as facilitator between public and private entities • TANN publishes traffic speed, incident and video data to business partners for publishing to travellers on web sites, handheld PCs, cable television and in-vehicle devices • Revenue generated through creation of leveraged advertising opportunities
Coordinated Implementation of ATIS for New York / Northern New Jersey / South Western Connecticut	• Public – Region's 14 member agencies	• Public – through TRANSCOM from the region's 14 member agencies	• Public – alpha-numeric pager system, phone, fax VMS, HAR	• Public Agency Framework – 14 public agencies coordinated through TRANSCOM • Private partners not fully determined yet
Atlanta NAVIGATOR	• Public – Georgia DOT	• Public – through NAVIGATOR	• Public – NAVIGATOR web site (www.georgianavigator.com), CCTV, *DOT free statewide cellular phone service, cable TV, kiosks	• Public Agency Framework – includes Georgia DOT, City of Atlanta, five counties and MARTA • Free data provided from NAVIGATOR web site to private companies, such as SmartRoute

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
Houston TranStar	• Public – Texas DOT	• Public – through TranStar	• Public – TranStar web site (www.houstontranstar.org), DMS, HAR, cable TV (ABC, CBS, NBC, News 24 and FOX)	• Public Agency Framework – a partnership of Texas DOT, Harris County, Metropolitan Transit Authority of Harris County and City of Houston • TranStar established multi-media partnership with major news and local TV outlets in Houston, also provided other outlets including Metro Traffic Network, Traffic Pulse Networks and the Houston Chronicle with traffic and weather-related information • Annual license fee paid by TV stations, with free time for public service announcements, for access rights to video images from CCTV cameras • One of the first centers combining transportation and emergency management
Gary-Chicago-Milwaukee (GCM) ITS Corridor Multi-Modal Gateway Traveller Information System	• Public – Illinois DOT, Indiana DOT, and Wisconsin DOT	• Public – led by Illinois DOT, Indiana DOT, and Wisconsin DOT in cooperation with University of Illinois at Chicago Department of Electrical Engineering and Computer Science (UIC-EECS)	• Public – Gateway web site (www.gcmtravel.com), cable TV, kiosks, personal communication devices	• Public Agency Framework – inter-agency agreement signed between Illinois, Indiana and Wisconsin DOT to equally fund continued consultant program management and technical support services • Contracting for Services – Gateway Central TIS developed by Parsons Transportation Group with project management by Illinois DOT • Free access to information by private organizations, such as traffic.com, governed by Illinois DOT policies and guidelines

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
Cincinnati / Northern Kentucky ARTIMIS	• Public – Ohio DOT • Private – SmartRoute for CCTV cameras	• Public – through ARTIMIS	• Public – ARTIMIS web site (www.artimis.org), CCTV, CMS, HAR, 511 traveller advisory telephone service	• Public Agency Framework – Ohio DOT with Kentucky Transportation Cabinet (KYTC) as contracting agency, along with Ohio-Kentucky-Indiana Council of Governments (OKI), Federal Highway Administration, and City of Cincinnati as advisors • Contracting for Services – TRW under contract to KYTC with SmartRoute Systems as subcontractor operating control center under contract to TRW • SmartRoute allowed to sell information with public sector receiving 30% of gross revenues • Non-exclusive agreement with right by KYTC to allow access to camera images by TV stations
Detroit	• Public – Michigan DOT • Private – SmartRoute for CCTV cameras	• Private – SmartRoute	• Public – Michigan DOT web site (www.michigan.gov/mdot) run by metrocommute.com • Private – SmartRoute web site (www.smartroute.com) (Detroit traffic no longer featured on SmartRoute web site at time of writing)	• Public Agency Framework – public agreement between Michigan DOT, Road Communication for Oakland County and University of Michigan • Contracting for Services – SmartRoute under 5-year contract to Michigan DOT commencing December 1998 to run the Michigan ITS Center with exclusive rights to publicly collected data • SmartRoute contracted with radio and TV station to provide customized information • No public funds involved, with Michigan DOT having contractual right to receive 10% of gross revenues

Table 3.1 : ATIS Experience in Other Jurisdiction

Initiative	Data Collection	Data Fusion	Data Dissemination	Business Relationship
Los Angeles County RIITS (Regional Integration of Intelligent Transportation Systems) (in progress)	• Public – Los Angeles County Metropolitan Transportation Authority (LACMTA)	• Public – through RIITS	• Public – Los Angeles County web site (www.riits.net)	• Public Agency Framework – sponsored by LACMTA with multiple transportation agencies within Los Angeles County including Caltrans District 7, California Highway Patrol, Los Angeles World Airports, City of Los Angeles DOT, and Los Angeles County Department of Public Works, Fire Department and Sheriff Department • Contracting for Services – National Engineering Technology Corporation under contract to LACMTA for the development of the RIITS Network
Utah CommuterLink	• Public – Utah DOT	• Public – Utah DOT	• Public – Utah web site (commuterlink.utah.gov), 511 travel information line (www.ut511.com), electronic roadway signs, radio, television	• Public Agency Framework – a partnership of UDOT, Salt Lake City, Wasatch Front Regional Council, Mountainlands Association of Governments, Salt Lake County, Department of Public Safety, Utah Department of Air Quality, Utah Transit Authority and Federal Highway Administration
Boston	• Public – Massachusetts Highway Department	• Private – SmartRoute	• Private – SmartRoute web site (www.smartroute.com), *1 interactive phone system	• Contracting for Services – SmartRoute under contract to Massachusetts Highway Department • Fee for service contract basically paying for the phone system and the audio text system
Philadelphia	• Public – Pennsylvania DOT	• Public – through two public traffic management centers • Private – SmartRoute	• Private – SmartRoute web site (www.smartroute.com), #211 interactive phone system	• Contracting for Services – SmartRoute under contract to Pennsylvania DOT • Fee for service contract basically paying for the phone system and the audio text system

TRANS LINK

Regional Advanced Traveller Information Systems

APPENDIX III
Functional Design

Final
June 24, 2004

DELCAN

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1. INTRODUCTION

1.1 Project History

The Greater Vancouver Transportation Authority (also known as TransLink) was created in 1999, and is responsible for planning, financing and operating a regional transportation system that moves people and goods efficiently, and supports the regional growth strategy, air quality objectives and economic development of the Greater Vancouver Regional District (GVRD).

Despite a comprehensive network of multi-modal transportation links, the GVRD's transportation system faces many challenges. The ITS Corporation of British Columbia was established, as a subsidiary of the Greater Vancouver Transportation Authority ("TransLink"), to define an ITS program and guide the development and implementation of ITS projects in the region and province.

In November 2001, the Province of British Columbia, with Transport Canada and the ITS Corporation, completed the BC Provincial Intelligent Transportation Systems (ITS) Vision and Strategic Plan for using advanced technologies to help solve provincial, regional and local transportation issues. This plan provides overall directions for the deployment of ITS within the Province of British Columbia by identifying 23 initiatives that provide the steps to achieving the Province's ITS strategies.

As part of the initiative to examine areas of interest to determine the "next step" for joint projects, the ITS Corporation has instigated the development of a concept of operation for a regional advanced traveller information system (ATIS) for Greater Vancouver.

1.2 Purpose of the document

The purpose of the functional design document is to provide the reader a system overview from ATIS users' perspectives. Using a system development approach, the information gathered in the surveys with various agencies and data collection for technical system inventory is analysed for the development of the concept of operations and system architecture. This will set the stage for the system functional design of the regional ATIS for Greater Vancouver.

The document will provide guidance and direction to help ensure that the subsequent design and development result in the type of systems that best serve the Greater Vancouver Transportation Authority's needs, and which represent an effective utilization of limited budgetary funds. The document will subsequently assist in identifying the providers and users of ATIS information, defining the ATIS information flows and providing an overall context for the system. The concept document provides a scope for the development of the system architecture. It will also assure that the operational needs of the ATIS are consistent with GVRD's resources and policies to realize the maximum possible benefit from the investment.

1.3 Background

Advanced Traveller Information Systems (ATIS) are designed to use advanced systems and technologies to manage information to help drivers decide when to drive and the route to drive, as well as opportunities to reserve rides and other traveller services. The systems make use of information and communication technologies to deliver information to a wide range of travellers who use different modes of travel and have a wide variety of characteristics. Information enables users to make better travel choices and supports better use of existing transportation facilities. Such systems have the potential to improve the operation of the transportation network and raise the perceived quality of the user's experience through the provision of good usage and option information.

The regional ATIS for Greater Vancouver is one that will gradually develop over time as the availability of information (such as real-time as well as planned transit schedules, incident detection, etc.) becomes more widely available and dependable. The intention of the project is to develop a concept of operation for a regional ATIS for Greater Vancouver area and demonstrate the feasibility of the system through a first phase implementation.

The project will take advantage of the ITS Corporation's structure to bring together the efforts of many existing regional agencies to create an integrated and unified regional traveller information service. The primary objective of the project is therefore to provide a traveller information system for the Greater Vancouver area that makes use of multiple information delivery systems to provide trip information to the user, when and where it is required, in the appropriate format, and with the appropriate content and timing, to effectively support travel decisions such as choice of mode, choice of route and timing of the trip.

2. GOALS AND OBJECTIVES

The vision of the Regional ATIS is to provide the users a "one stop" transportation portal to provide multi-modal, multi-jurisdiction, static as well as real-time traveller information for the Greater Vancouver area via various methods of dissemination.

The objective of the future of ATIS within Greater Vancouver is to provide traveller information to the user, when and where required by deploying multiple information delivery mechanism. The information provided will be in the appropriate format, and with the appropriate content and timing to effectively support travel decisions, such as choice of mode, choice of route, and timing of the journey. The system will also deliver sufficient information to enable hybrid or multimode trip options. The information is to be available at each stage of the trip, namely prior to departure (pre-trip), at departure and during the course of the journey, in a wide variety of customizable formats, including voice synthesized information bulletins, short messages and sophisticated map-type displays.

In summary, the goal is to design a regional ATIS for Greater Vancouver that provides:

- Pre-trip and en-route information that is accurate, timely and reliable;
- Adequate geographical coverage;
- Personalized access & decision guidance;
- Convenient access and speed; and
- Low cost of use (free service).

3. TYPES OF TRAVELLER INFORMATION

The traveller information of the regional ATIS for Greater Vancouver will include:

Real-time Information

Road / Traffic:

- Traffic conditions (e.g., incidents, congestion, travel times / speed, etc.)
- Bridge / tunnel status (e.g., open or closed, etc.)
- CCTV camera images (snap shots)
- Roadway conditions (e.g., road closures, icy, covered by snow, etc.)
- Safety advisory (e.g., chemical spillage, etc.)
- Emergency information (e.g., evacuation, etc.)
- Parking availability (e.g., number of spaces available)
- Weigh station information
- Border wait time

Transit:

- Service status (e.g., cancellation, delay, bus location, etc.)
- Parking availability (e.g., number of spaces available)

Multi-modal (Air / Port / Ferry / Inter-regional Rail):

- Service status (e.g., cancellation, delay, estimated arrival / departure, location, etc.)
- CCTV camera images (snap shots)
- Parking availability

Environmental:

- Environmental information (e.g., weather, air quality, etc.)

Static Information

Road / Traffic:

- Route maps
- Alternative routes
- Special events (e.g., major sport games, etc.)
- Planned events (e.g., construction, etc.)
- Parking and ridesharing information
- Commercial goods vehicles restriction routes

Transit:

- System route maps
- Transit schedules and routes (e.g., bus, train, etc.)
- Fare information
- Special events (e.g., major sport games, etc.)
- Planned events (e.g., construction, etc.)
- Parking and ridesharing information

Multi-modal (Air / Port / Ferry / Inter-regional Rail):

- Port information (e.g., hours of operations, etc.)

- Ferry information (e.g., timetable, etc.)
- Airport information (e.g., flight schedules, etc.)

Based on the discussions and conclusion during the technical meeting in early 2004, the traveller information will be bundled to cater for the needs of specific user groups, i.e., region of origin, mode of travel, specific agency, etc.

4. GEOGRAPHICAL COVERAGE

Geographical coverage area for the ATIS includes the Greater Vancouver area and the inter-regional links. Namely, the geographical coverage area includes:

Greater Vancouver Area

- Vancouver
- Richmond
- Burnaby
- New Westminster
- Delta
- West Vancouver
- City of North Vancouver
- District of North Vancouver
- Port Moody
- Coquitlam
- Port Coquitlam
- Pitt Meadows
- Surrey
- White Rock
- City of Langley
- Langley Township
- Maple Ridge
- Mission
- Abbotsford
- Anmore
- Belcara
- Bowen Island
- Lion's Bay

Inter-regional Links

British Columbia Interior:

- Highway 7 (at Mission)
- Highway 1 (at Abbotsford)

Canada-U.S. Border:

- Highway 99 (Peace Arch)
- Highway 15 (Pacific Highway Border Crossing)
- Highway 13 (Aldergrove Border Crossing)
- Highway 11 (Huntington Border Crossing)

Squamish / Whistler:

- Highway 99 North (Sea to Sky Highway)

Gulf / Vancouver Islands:

- Tsawwassen Ferry Terminal

- Horseshoe Bay Terminal

Ports:

- Vancouver Port
- Fraser Port
- Delta Port

Airports:

- Vancouver International Airport (YVR)
- Abbotsford Airport

5. MAJOR DATA SOURCES

The major sources for ATIS data in the initial stage (short term) include:

- TransLink ("Greater Vancouver Transportation Authority");
- British Columbia Ministry of Transportation ("BCMoT");
- Commercial Vehicle Safety and Enforcement Division (CVSE) of Ministry of Public Safety and Solicitor General;
- Greater Vancouver Municipalities (e.g., Vancouver, Richmond, Delta, Surrey, Coquitlam, etc.);
- Vancouver International Airport Authority ("YVR");
- ECOMM / PRIME (Police Records Information Management Environment);
- Vancouver Port Authority ("VPA");
- Canada / U.S. Customs;
- BC Ferries;
- Media (e.g., City TV); and
- Environment Canada.

Other additional sources of traveller information identified that may be incorporated in the future include:

- Other ferry services (e.g., Harbour Lynx, Aqua Bus, False Creek Ferries, etc.);
- Vancouver Trolley Bus Service;
- Jack Bell RideShare; and
- Private and Inter-regional Bus Services (Pacific Coach, Perimeter, Airporter).

Table 5.1 summarizes the data sources and the potential ATIS data.

Table 5.1 : Potential ATIS Data and Data Source

Agency	Potential ATIS Data
Road / Traffic:	
MoT – Tunnel and Bridge Control Centres	• CCTV images • Lane status • Congestion (George Massey Tunnel)
MoT – Border ATIS	• CCTV images • Border delays
MoT – Drive BC	• Incidents • Road conditions • Weather • Closures

Table 5.1 : Potential ATIS Data and Data Source	
Agency	**Potential ATIS Data**
GVA – Cities	• CCTV images • Construction • Maintenance
Canada / U.S. Border CCRA, U.S. Customs, WSDOT, A&A Brokers	• CCTV images • Border delays
Commercial Vehicle Safety and Enforcement	• Weigh station information
ECOMM / PRIME	• Incidents for Vancouver, Richmond and RCMP
University of British Columbia ("UBC"), Simon Fraser University, BCIT, etc.	• Special events
Jack Bell RideShare	• Vanpooling / carpooling / ride matching
Transit:	
TransLink Bus, WCE, SkyTrain, SeaBus	• Schedules • Routes • Fares
TransLink Bus, WCE, SkyTrain, SeaBus	• Service status • 98B Line AVL
Inter-regional Bus Pacific, Airporter, Perimeter	• Schedules • Routes • Fares
Other Transit Services False Creek Ferries, Aqua Bus, Trolley Bus	• Schedules • Routes • Fares
Vancouver International Airport Authority	• Flight status • Flight schedules
Multi-modal:	
Vancouver Port Authority	• Port CCTV • Cruise schedules
BC Ferries	• Schedules • Routes • Fares • Service status

Table 5.1 : Potential ATIS Data and Data Source	
Agency	**Potential ATIS Data**
Inter-regional Rail Amtrak / VIA	• Schedules • Routes • Fares
Environmental:	
Environment Canada	• Air quality • Weather forecasts • Radar maps

6. USER REQUIREMENTS

6.1 General

Current research in North America of ATIS users, as well as the general public that are not yet ATIS users, has identified four major factors that influence ATIS service demand, and in turn, the user requirements:

- Geographical Regional Traffic Context – This includes attributes of the region, such as highway-roadway network and capacity, levels of traffic congestion, and future highway-roadway expansion plans. Prime ATIS markets appear to be highly congested regions that have limited build-out options, constrained alternate route possibilities, and frequent unpredictable traffic events (e.g., weather, collisions, etc.).

- Quality of ATIS Services – Traffic information quality determines whether, how frequently, and with what level of confidence the user consults traveller information. Quality determines whether the information will meet customer needs with respect to personal benefit and value.

- Individual Trip Characteristics – The trip purpose, the time of the trip in relation to peak congestion periods, trip length, and the particular route or route choices available to the individual user all have a significant effect on whether the individual will consult traveller information. To a limited extent, the availability and convenience of alternative mode choices for a given trip affects use of ATIS. Travel time flexibility, or lack thereof, is another determinant in the choice to consult traveller information.

- Characteristics of User – Values and attitude characteristics of the ATIS user, or potential user, are important determinants of user awareness, use patterns, behavioural responses, and evaluation of ATIS. Accessibility to device types, such as access to broad band services, is another determinant affecting use pattern.

Market surveys of current users of ATIS have provided insights into motivations of use. In general, motorists who have used traveller information services have indicated that they use the information to:

- Assess traffic congestion on their route;
- Judge the effects of incidents on their trip;
- Decide among alternate routes;
- Estimate their trip duration; and
- Time their trip departure.

As a result, the decisions that they make based on the traveller information are:

- Change route or time of departure to improve trip time;

- Change route or time of travel to reduce the stress of driving in congestion;
- Adjust their expectations; and
- Confirm their trip plan.

The benefits perceived by the users from use of the traveller information include:

- Saved time;
- Avoided congestion;
- Reduced stress; and
- Avoided unsafe conditions.

The following attributes are considered critical for the provision of the ATIS services:

- Accuracy of information;
- Timeliness of information;
- Reliability of information;
- Cost to use (capital and operating);
- Degree of decision guidance and personalization of information;
- Convenience of access and speed; and
- Safety of operation.

6.2 User Groups

The identified users of the regional ATIS for Greater Vancouver include the general public and commercial operators and they can be generally classified as follows:

- General Public
  - Motorists
    - Regular commuters; and
    - Occasional users and tourists.
  - Transit Users
    - Regular commuters; and
    - Occasional users and tourists.
  - Cyclists
  - Pedestrians
- Commercial Operators
  - Emergency services; and
  - Private fleets (CVO, taxis, buses, etc.).

While some of the user requirements are the same for various user groups, different user groups will have unique user requirements. Therefore, the ATIS information should be bundled to the needs of specific user groups by mode of travel. The user requirements for cyclists and pedestrians are consolidated with transit users as generally the facilities available are the same.

The application of ATIS information for various user groups is summarized in Table 6.1 in the following page.

The user requirements are organized in the subsequent sections abound the two key components of a transportation trip where users are likely to require the information:

- Pre-trip planning
- En-route planning

Table 6.1 : Application of ATIS Information to Various User Groups

Descriptions	Information Type	Motorists	Transit Users	Commercial Operations
Real-time Information:				
Traffic conditions (e.g., incidents, congestion, travel times / speed, etc.)	Real Time	√		√
Roadway conditions	Real Time	√		√
Bridges & tunnels service status (e.g., open, closed, etc.)	Real Time	√		√
Transit service status (e.g., cancellation, delay, etc.)	Real Time		√	
Environmental information (e.g., weather, air quality, etc.)	Real Time	√	√	√
Safety advisory (e.g., chemical spillage, etc.)	Real Time	√	√	√
Emergency information (e.g., evacuation, etc.)	Real Time	√	√	√
Parking availability (e.g., number of spaces available)	Real Time	√	√	
Weigh station information	Real Time			√
Border wait time	Real Time	√	√	√
Static Information:				
Highway / arterial route maps	Static	√	√	√
Transit maps	Static		√	
Closest stops / stations	Static		√	

Table 6.1 : Application of ATIS Information to Various User Groups				
Descriptions	**Information Type**	**Motorists**	**Transit Users**	**Commercial Operations**
Transit schedules and routes (e.g., bus, train, etc.)	Static		√	
Transfer details including route, required transfers, transfer location	Static		√	
Fare information	Static		√	
Special events	Static	√	√	√
Parking and ridesharing information	Static	√	√	
On-line trip planners	Static	√	√	
Facilities for disability access	Static		√	
Commercial vehicle permits and route restrictions	Static			√
Canada-U.S. border initiatives / customs service status	Static			√
Real-time / Static Information :				
Port information (e.g., ferries, etc.)	Real Time Static	√	√	√
Airport information (e.g., flights, etc.)	Real Time Static	√	√	√

6.3 Information Users Would Like to Have

6.3.1 Pre-trip Information

General

The required pre-trip information common to motorists, transit users and commercial operators includes:

- Special events (e.g., major sport games, etc.);
- Environmental information (e.g., weather, air quality, etc.);
- Port information (e.g., ferry timetable, etc.);
- Airport information (e.g., flights, etc.);
- Safety advisory;

- Emergency information; and
- Border wait time information.

As the regular commuters know how to travel a familiar trip (e.g., daily commute), and have higher confidence planning a trip, information requirements for regular commuters for a familiar trip can be less than occasional commuters.

The information should be able to be printed on paper, accessed via computer, telephone or kiosks.

Some of the information such as timetable can be downloadable from the web portal to the users' personal digital assistants (PDAs) for later reference.

Motorists

The pre-trip information required specifically by the motorists includes:

- Traffic conditions (e.g., incidents, congestion, travel times / speed, detours, delays etc.);
- Roadway conditions (e.g., road closures, icy, covered by snow, etc.);
- Bridge / tunnel service status (e.g., open, closed, etc.);
- Route maps;
- Trip planning / alternative routes;
- Planned events (e.g., construction, etc.);
- Environmental information (e.g., weather, air quality, etc.);
- Parking availability (e.g., number of spaces available); and
- Parking and ridesharing information (e.g., for passengers using ridesharing facilities).

Transit Users

The pre-trip information required specifically by the transit users includes:

- Transit maps;
- Service status (e.g., cancellation, transit delay, etc.);
- Closest bus stops and train stations;
- Transit schedules and routes (e.g., bus, train, etc.):
  - What route to take to reach the destination;
  - Transfer details including route, required transfers, transfer location;
- Fare information;
- Facilities for wheelchair access;
- Parking availability (e.g., number of spaces available);
- Parking and ridesharing information (e.g., for passengers using park-and-ride facilities); and
- On-line itinerary planners.

Commercial Operators

The pre-trip information required specifically by the commercial operators includes:

- Traffic conditions (e.g., incidents, congestion, travel times / speed, detours, delays, etc.);
- Roadway conditions (e.g., icy, covered by snow, etc.);
- Bridge / tunnel service status (e.g., open, closed, etc.);
- Route maps;
- Alternative routes;
- Commercial vehicle permits and route restrictions;
- Weigh station information;
- Planned events (e.g., construction, etc.);
- Environmental information (e.g., weather, air quality, etc.); and
- Canada-U.S. border / customs information (e.g., Nexus, FAST, etc.).

6.3.2 En-Route Information

The requirements for en-route information can be subdivided into the two key categories of information dissemination:

- Wayside information (e.g., DMS, kiosks, etc.);
- On-board / In-vehicle information (e.g., in-vehicle navigation, etc.); and
- Digital message services, WAP enabled cell phone, wireless PDA etc.

6.3.2.1 Wayside information

Motorists

The wayside information required by the motorists includes:

- Traffic conditions (e.g., incidents, congestion, travel times / speed, detours, delays, etc.);
- Roadway conditions (e.g., road closures, icy, covered by snow, etc.);
- Bridge / tunnel service status (e.g., open, closed, etc.);
- Special events (e.g., major sport games, etc.);
- Parking availability (e.g., number of spaces available);
- Parking and ridesharing information (e.g., for passengers using ridesharing facilities);
- Emergency information (e.g., evacuation, etc.); and
- Safety advisory (e.g., chemical spillage, etc.).

Transit Users

The wayside information required by the transit users includes:

- Transit maps;
- Transit schedules and routes (e.g., bus, train, etc.):
  - Arrival time for next bus / train;
  - Transfer details including route, required transfers, transfer location;
- Service status (e.g., cancellation, transit delay, etc.);
- Fare information;
- Emergency information (e.g., evacuation, etc.);
- Safety advisory (e.g., chemical spillage, etc.);
- Facilities for disability access;
- Special events (e.g., major sport games, etc.);
- Environmental information (e.g., weather, air quality, etc.);
- Parking availability (e.g., number of spaces available); and
- Parking and ridesharing information (e.g., for passengers using park-and-ride facilities).

Commercial Operators

The wayside information required by the commercial operators includes:

- Traffic conditions (e.g., incidents, congestion, travel times / speed, detours, delays, etc.);
- Roadway conditions (e.g., icy, covered by snow, etc.);
- Bridge / tunnel service status (e.g., open, closed, etc.);
- Special events (e.g., major sport games, etc.);
- Emergency information (e.g., evacuation, etc.);
- Weigh station information; and
- Safety advisory (e.g., chemical spillage, etc.).

6.3.2.2 On-board / In-vehicle Information

Motorists

The on-board / in-vehicle information required by the motorists includes:

- Traffic conditions (e.g., incidents, congestion, travel times, detours, etc.);
- Roadway conditions (e.g., road closures, icy, covered by snow, etc.);
- Bridge / tunnel service status (e.g., open, closed, etc.);
- Route maps showing current location;
- Alternative routes;
- Emergency information (e.g., evacuation, etc.); and
- Safety advisory (e.g., chemical spillage, etc.).

Transit Users

The on-board / in-vehicle information required by the transit users includes:

- Transit maps showing the current location and transfer locations;
- Service status (e.g., cancellation, transit delay, etc.);
- Emergency information (e.g., evacuation, etc.); and
- Safety advisory (e.g., chemical spillage, etc.).

Commercial Operators

The on-board / in-vehicle information required by the commercial operators includes:

- Traffic conditions (e.g., incidents, congestion, travel times, detours, etc.);
- Roadway conditions (e.g., icy, covered by snow, etc.);
- Bridge / tunnel service status (e.g., open, closed, etc.);
- Route maps showing current location;
- Alternative routes;
- Emergency information (e.g., evacuation, etc.);
- Weigh station information;
- Safety advisory (e.g., chemical spillage, etc.); and
- Canada-U.S. border / customs service status (e.g., Nexus, FAST, open or closed, etc.).

6.4 Information Requirements

The minimum information required for the regional ATIS for Greater Vancouver is summarized in Table 6.2. The additional information such as levels of traffic congestion, dynamic map, etc. required for the web portal is tabulated in Table 6.3.

Table 6.2 : Minimum Information Requirements	
Descriptions	**Information Requirements**

Table 6.2 : Minimum Information Requirements	
Descriptions	**Information Requirements**
Traffic conditions (e.g., incidents, congestion, travel times / speed, etc.)	• Locations of the incidents • Incident reports for collisions, breakdowns, emergency roadworks showing: – Location – Description – Start time – Expected duration – Expected traffic impact – Expected delay – Closest camera ID / icons • "Real-time" (updated every few minutes) congestion level of various sections of highways and major arterials • Camera map to display CCTV camera images • Travel time between key origins and destinations in minutes
Roadway conditions	• Conditions of various highways and major arterials: – Road is bare – Road is partially snow covered – Road is snow covered – Road is icy / slippery – Road is closed
Bridges and tunnel service status (e.g., open, closed, etc.)	• Service status of all bridges and tunnel
Highway / arterial route maps	• Highways • Major arterials • Key destinations / points of interest / tourist attractions • Trip planning

Table 6.2 : Minimum Information Requirements	
Descriptions	**Information Requirements**
Special events	• Location of the special events • General description of the events • Start time of the events • Bus / train and numbers to the events from various directions • Highway / arterial routes from various directions to the events • Nearby parking facilities • Walking distance to the events from the closest transit station
Environmental information (e.g., weather, air quality, etc.)	• Current weather conditions • Weather forecast • Weather warning • Visibility is good / fair / poor • Sunrise / sunset
Port information	• Various port locations • Sailing timetable • Restrictions if any • Hours of operations
Ferry information	• Various ferry departure locations • Timetable sorted by ferry • Restrictions if any • Fare information • Hours of operations
Airport information (e.g., flights, etc.)	• Airport location • Current timetable sorted by airline • Current flight status on arrival / departure times
Safety advisory (e.g., chemical spillage, etc.)	• Locations of the safety advisory • Nature and descriptions of the safety advisory • Location • Severity / impact

Table 6.2 : Minimum Information Requirements	
Descriptions	**Information Requirements**
Parking and ridesharing information	• Parking lot locations • Parking capacity • Hours of parking operations • Hours of free parking • Parking charges • Vanpooling / carpooling / ride matching
On-line trip planners	• Printout of itinerary • Costs • Route map for key destinations / points of interest
Transit maps	• Route map showing: – Highways – Major arterials – Key destinations / points of interest / tourist attractions – Bus / train routes – Bus / train route numbers – Train station locations
Closest bus stops / train stations	• Same as above • Exact bus stop / train station locations
Transit schedules and routes (e.g., bus, train, etc.)	• Transit map • Information on connecting transits • Information on parking and ridesharing along the route • Arrival time for next bus / train at the bus stops or train stations
Route to take to reach the destination	• List of key destinations showing the relevant bus / train route numbers • Route and schedule • Fare calculation across fare zones
Transfer details including route, required transfers, transfer location	• Transfer locations

Table 6.2 : Minimum Information Requirements	
Descriptions	**Information Requirements**
Transit service status (e.g., cancellation, delay, etc.)	• Delay, cancellation, etc. • Nature and descriptions of the delay • Details of the location • Severity / impact on major and connecting routes • Links to TransLink and related transit web sites
Fare information	• Regular fare information • Information on discounted fares such as connecting transit, disability, tourists, etc. • Information on passes
Facilities for disability access	• Station locations • Map of stations showing disability access within and around the stations
Emergency information (e.g., evacuation, etc.)	• Location of the emergency • Nature and descriptions of the emergency • Details of the location • Severity / impact • Links to ECOMM web site
Commercial vehicle permits and restrictions	• Routes of the restrictions • Description of the restriction • Details of the location • Day / time of restrictions • Weigh station information • Links to related web sites
Border wait time	• Various border locations • Cameras map or list • Estimated wait times by border locations • Estimated wait times by U.S.-bound and Canada-bound directions • Estimated wait times by commercial and traveller flows if applicable

Table 6.2 : Minimum Information Requirements	
Descriptions	**Information Requirements**
Canada-U.S. border initiatives / customs information	• Locations of the Free and Secure Trade (FAST) program sites and Nexus • Hours of Free and Secure Trade (FAST) program at different borders • Hours of Nexus operations at different borders • Links to related web sites

Table 6.3 : Additional Requirements Specific to Web Portal	
Descriptions	**Additional Requirements Specific to Web Portal**
Traffic conditions (e.g., incidents, congestion, travel times / speed, etc.)	• Clickable map by region / zone • Dynamic map showing locations of the incidents • Incident reports for collisions, breakdowns, emergency roadworks in text format • "Real-time" (updated every few minutes) dynamic traffic route map showing congestion level of various sections of highways and major arterials: – Green: normal – Amber: moving slowing – Red: very slow – Gray: no data • Clickable camera map to display CCTV camera images
Roadway conditions	• Clickable route map showing roadway conditions of various highways and major arterials: – Road is bare – Road is partially snow covered – Road is snow covered – Road is icy / slippery – Road is closed
Bridges and tunnel service status (e.g., open, closed, etc.)	• "Real-time" (updated every few minutes) dynamic map showing the service status of all bridges and tunnel: – Green: normal – Amber: partially closed / blocked – Red: closed
Highway / arterial route maps	• Common maps or formats are to be used such as the provincial digital road atlas (Geodata BC): – Clickable route map with zoom / pan capability
Special events	• Clickable map showing the location of the special events and hyperlink text showing the details of the special events
Environmental information (e.g., weather, air quality, etc.)	• In text and graphical pictures format

Table 6.3 : Additional Requirements Specific to Web Portal	
Descriptions	**Additional Requirements Specific to Web Portal**
Port information	• Click map showing different port locations • Upon clicking the location, details will be shown in text format
Ferry information	• On-line map showing different ferry departure locations • Upon clicking the location, details will be shown in text format
Airport information (e.g., flights, etc.)	• On-line map showing airport location • Upon clicking the location, details will be shown in text format
Safety advisory (e.g., chemical spillage, etc.)	• Dynamic map showing locations of the safety advisory as symbols • Upon clicking the location, details will be shown in text format
Parking and ridesharing information	• Clickable map organized by area and or by transit line • Upon clicking the transit line, the details will be shown in static format
On-line trip planners	• Printout of itinerary • Costs • Route map for key destinations / points of interest
Transit maps	• Clickable route map with zoom / pan capability • Upon clicking the location, details will be shown in static format
Closest bus stops / train stations	• Same as above • Exact bus stop / train station locations
Transit schedules and routes (e.g., bus, train, etc.)	• On-line transit map (stations are clickable) • Printable • Downloadable to PC and PDA for future reference

Table 6.3 : Additional Requirements Specific to Web Portal	
Descriptions	**Additional Requirements Specific to Web Portal**
Route to take to reach the destination	• List of hyperlinked key destinations showing the relevant bus / train route numbers • Showing the route and schedule upon clicking the bus / train route numbers • The key destinations should be organized by area and by different categories such as recreational, community facilities, businesses, tourist attractions, etc.
Transfer details including route, required transfers, transfer location	• On-line transit map • Printable • Downloadable to PC and PDA for future reference
Transit service status (e.g., cancellation, delay, etc.)	• "Real-time" (updated every few minutes) dynamic map showing the service status of all bridges and tunnel: – Green: normal – Amber: partially closed / blocked – Red: closed
Fare information	• Organized by transit and orientation and destination • Upon selection, details will be shown in text format
Facilities for wheelchair access	• On line transit map (stations are clickable) • On line map of stations showing wheelchair access within and round the stations • Printable • Downloadable to PC and PDA for future reference
Emergency information (e.g., evacuation, etc.)	• Dynamic map showing locations of the emergency as symbols • Upon clicking the symbols, details will be shown in text format
Commercial vehicle permits and route restrictions	• Static map showing routes of the restrictions • Upon clicking the location, details will be shown in text format
Border wait time	• Static map showing different border locations • Clickable cameras to display snap-shoots of CCTV cameras if available

Table 6.3 : Additional Requirements Specific to Web Portal	
Descriptions	**Additional Requirements Specific to Web Portal**
Canada-U.S. border initiatives / customs information	• Static map showing various locations of the Free and Secure Trade (FAST) program sites and Nexus

7. DISSEMINATION METHODS

7.1 General

The regional ATIS for Greater Vancouver is one that will gradually develop over time as the availability of information (such as real-time as well as planned transit schedules, incident detection, etc.) becomes more widely available and dependable. For the initial phase, a web portal is to be used as the primary tool for traveller information dissemination. Other mechanisms to be considered in future phases include commercial media (TV, radio), kiosks, roadside dynamic message signs (DMSs), email, phone, personal digital assistant (PDA), in-vehicle units, etc.

In summary, the dissemination methods and their deployment schedule are:

Short Term

- Web portal
- Media (TV, radio)
- Phone (GMS)

Medium Term

- Kiosks
- Email
- Personal digital assistant (PDA)

Long Term

- Dynamic message signs (DMSs)
- In-vehicle units

At the initial stage, the regional ATIS for Greater Vancouver is to be developed and disseminated in English language only. However the needs of non-English speakers should be addressed through effective use of graphics and icons. In addition, the dissemination mechanism should meet the needs of the disabled, with use of accessible technology such as voice activated text, telecommunications device for the deaf (TTY), etc.

General descriptions of each dissemination method are included in the following section. A summary of the information available for each dissemination method is tabulated in Table 7.1.

7.2 Web Portal

The web portal will present a single, comprehensive source of information to travellers within the Greater Vancouver region. From this single source, travellers and commercial

vehicle operators will have access to all of the information identified in this document in a simple, intuitive format. The portal will combine information that is retrieved from stakeholders through a common look and feel with information available from established web sites and portals to ensure the user does not have to use more than one source for all their travelling information needs.

The cornerstone of the portal will be a feature-rich interactive map that will present numerous layers of information to the traveller. It will allow the user to see current incident and congestion information in a graphical form, and further allow the use of toggle switches to include the road, rail, marine and air travel networks at the same time. Travellers will also have the ability to view the locations of all traffic and border cameras situated on the same map if they choose. The interactivity of the map will present the user with the ability to customize the view to fit their travelling needs. Finally, the map will be designed to allow the user to zoom into a specific region, and then pan the view of the map across the region, allowing even greater control over what the traveller sees.

Incident and event information, along with transit and border delay information and news will be available from both the portal home page and a more detailed information page to allow the traveller access to descriptions of issues they may need to take into consideration when planning their trip. This information will be presented in a news format that includes a filter to make it easy to exclude information that does not apply to the area the traveller is interested in.

The portal will provide travellers access to an interactive trip planning tool that is currently available from the main TransLink web site.

While the traffic and border cameras will be available through the interactive map, a separate section of the portal will be dedicated to cameras to allow the traveller to quickly and easily navigate to a camera, or a series of cameras, view they wish to see.

Additional content areas include:

- Motorist specific information
- Public transit information including buses, rail, and marine
- Commercial transit information including buses, rail, marine and air
- Commercial vehicle operator focused information
- Cycling information
- Current weather and forecasts
- Information for handicapped travellers
- Tourist resources

The commercial transit Information section will contain links to display information from the BC Ferries and Vancouver International Airport web sites related to schedules and arrival and departure times and statuses.

7.3 Media

Timely and accurate ATIS information can be available from ATIS and be sent automatically to media such as commercial TV stations and radio stations subscribing the ATIS services such as fax and email. In turn, the media can disseminate the timely information to the general public. In addition to the textual information, video feeds for traffic cameras can be linked to media for their dissemination.

The media service subscription can be based on one of the following types:

Fixed Schedule

The media specifies in advance when they would like to receive traffic reports. This can be set up for unscheduled and/or scheduled events.

Event Driven

Whenever an event is added, updated, or terminated, the media will receive a traffic report. The media can choose the "window" of time in which they want to receive faxes (for example, only during rush hours).

Emergency Events

The media will only receive emergency events that have severe impacts on traffic.

7.4 Kiosks

Kiosks can be strategically located throughout the GVA and its surrounding areas. These locations can be:

- Transit stations
- Conference centres
- Major tourists attractions
- Shopping centres
- Rest areas along the highway
- Universities
- Arenas
- Community facilities
- Park-and-ride
- Border crossings
- Etc.

The kiosks should allow the users to print a hardcopy of the requested information upon request.

7.5 Emails

Subscribers of ATIS services will, in the future, be able to receive real-time ATIS information via emails from their computers, PDA or cell phones.

Based on pre-defined request, route-specific information will be available to the subscribers.

Similar to the media subscription, the email service subscription can be based on one of the following types:

- Fixed Schedule
- Event Driven
- Emergency Events

7.6 Personal Digital Assistants (PDA)

Personal digital assistants (PDA) will, in the future, be able to receive real-time ATIS information from PDA. Based on pre-defined request and the advent of GPS device, route-specific information will be available to the PDA users.

Similar to the media subscription, the PDA service subscription can be based on one of the following types:

- Fixed Schedule
- Event Driven
- Emergency Events

In addition, PDA users will be able to download other latest static information such as transit schedules, etc. to their PDA enroute if their PDA is equipped with wireless communication capabilities.

7.7 Phones

Subscribers of ATIS services will, in the future, be able to receive real-time ATIS information via text messages from their cell phones. Based on pre-defined request and the advent of the GPS technology, route-specific information will be available to the subscribers via their cell phones.

Similar to the media subscription, the ATIS service subscription for phone users can be based on one of the following types:

- Fixed Schedule
- Event Driven
- Emergency Events

The phone users will also be able to obtain latest information such as transit service status, schedule, etc. via the interactive voice response system.

7.8 Dynamic Message Signs

Dynamic message signs (DMS) along the highway, major arterial roads will, in the future, be able to provide the motorists the latest traffic and roadway information downstream of the signs. This information will enable the motorists to be caution of the events such as congestion, traffic incidents, etc. downstream of the signs or to divert to other alternative routes.

Smaller-scale DMSs at train stations and bus stops will provide the real-time ATIS regarding the service status and the arrival time of the next train / bus to the commuters.

7.9 In-vehicle Unit

Private passenger cars or commercial vehicles equipped with in-vehicle unit will, be able to receive real-time ATIS information via textual, graphical formats and/or voice notification (i.e., DAB, RDS-TMC). The in-vehicle unit can provide continuous alerts of recommended alternative routes if new conditions (such as new incidents) occur on the intended routes. It can provide other information such as continuous and updated estimated travel time.

For commercial vehicles, in-vehicle unit can also provide routing restrictions for specific vehicle cargoes and other information specific to commercial vehicles.

Table 7.1 : ATIS Information Available and Various Dissemination Methods

Information \ Dissemination Methods	Short	Medium Term					Long	
	Web Portal	Media	Kiosks	Email	PDA	Phones	DMS	In-vehicle
REAL TIME								
Road / Traffic:								
• Traffic conditions (e.g., incidents, congestion, travel times / speed, etc.)	√	√	√	√	√	√	√	√
• Bridge / tunnel status (e.g., open or closed, etc.)	√	√	√	√	√	√	√	√

Table 7.1 : ATIS Information Available and Various Dissemination Methods								
Information \ Dissemination Methods	**Short**	**Medium Term**					**Long**	
	Web Portal	**Media**	**Kiosks**	**Email**	**PDA**	**Phones**	**DMS**	**In-vehicle**
• CCTV camera images (snap shots)	√	√	√		√			
• Roadway conditions (e.g., road closures, icy, covered by snow, etc.)	√	√	√	√	√	√	√	√
• Safety advisory (e.g., chemical spillage, etc.)	√	√	√	√	√	√	√	√
• Emergency information (e.g., evacuation, etc.)	√	√	√	√	√	√	√	√
• Border wait time	√	√	√	√	√	√		√
Transit:								
• Service status (e.g., cancellation, delay, etc.)	√	√	√	√	√	√		
Multi-modal (Air / Port / Ferry / Inter-regional Rail):								
• Service status (e.g., cancellation, delay, etc.)	√	√	√	√	√	√		√
• CCTV camera images (snap shots)	√	√	√					
Environmental:								
• Environmental information (e.g., weather, air quality, etc.)	√	√	√	√	√	√		√
STATIC								
Road / Traffic:								
• Route maps	√		√					√
• Alternative routes	√	√	√	√	√	√	√	√
• Special events (e.g., major sport games, etc.)	√	√	√	√	√	√		√

Table 7.1 : ATIS Information Available and Various Dissemination Methods								
	Short	Medium Term					Long	
Information \ Dissemination Methods	**Web Portal**	**Media**	**Kiosks**	**Email**	**PDA**	**Phones**	**DMS**	**In-vehicle**
• Planned events (e.g., construction, etc.)	√	√	√	√	√	√	√	√
• Parking and ridesharing information	√		√	√	√			√
• Commercial goods vehicles restriction routes	√		√	√				√
• Weigh station information							√	√
Transit:								
• System route maps	√		√					
• Transit schedules and routes (e.g., bus, train, etc.)	√		√		√			
• Fare information	√		√					
• Special events (e.g., major sport games, etc.)	√		√		√		√	√
• Planned events (e.g., maintenance, etc.)	√		√	√	√			
• Parking and ridesharing information	√		√		√			√
Multi-modal (Air / Port / Ferry / Inter-regional Rail):								
• Port information (e.g., hours of operations, etc.)	√		√					
• Ferry information (e.g., timetable, etc.)	√		√					
• Airport information (e.g., flights, etc.)	√		√					

8. SCENARIOS

The following scenarios illustrate how the regional ATIS applies in practice.

Scenario 1: Commuter Attending a Special Event in Suburban Area via Transit
(Dissemination Methods: web portal, kiosk and DMS)

1. The user clicks on the hyperlink text on the web portal showing the name of the special event on the computer screen. Upon clicking, the following information in text format is displayed:

   - General description of the events;
   - Start time of the events;
   - Bus / train routes and numbers to the events from various directions;
   - Highway / arterial routes to the events;
   - Nearby parking facilities; and
   - Walking distance to the event from the closest transit station.

2. The user clicks on the hyperlink text of the bus / train route numbers to the event. Upon clicking, the direction the user is from, as well as several transit routes leading to the special event are shown on the screen.

3. Upon clicking on the transit route closest to the user, a transit schedule is displayed.

4. The user clicks on the "Park and Ride" link and a system map showing the all "Park and Ride" locations.

5. The user clicks on the closest "Park and Ride" location based on the above transit route, and the information above this "Park and Ride" location such as parking capacity, parking charge and a map showing the exact location of the parking.

6. The user clicks on the highway traffic map showing the real-time traffic conditions. The traffic conditions to the "Park and Ride" location are good and are showing "green" – i.e., moving well.

7. The user prints a hardcopy of the transit schedule (static) and the general description of the directions to the event, or downloads the information to his / her PDA, and drives to the "Park and Ride" location to take the transit.

8. Upon arriving at the "Park and Ride" location, the user verifies the transit conditions at the kiosk.

9. The user decides to continue his / her journey using the transit.

10. The arrival time for next bus / train is being displayed on DMS at the bus stop / train station and the user continues the trip as planned.

Scenario 2: Commuter Travelling to a Destination via Transit
(Dissemination Methods: web portal and phone)

1. The user clicks on the hyperlink text on the web portal to check on the transit schedule of the closest train station and the information regarding the park-and-ride facilities.

2. Upon clicking on the transit route closest to the user, a transit schedule is displayed.

3. The user clicks on the "Park and Ride" link and a system map showing the all "Park and Ride" locations.

4. The user clicks on the closest "Park and Ride" location based on the above transit route, and the information above this "Park and Ride" location such as parking capacity, parking charge and a map showing the exact location of the parking.

5. As the motorist is driving to the "Park and Ride" location, the user receives a no-service notification (he / she is an ATIS subscriber) regarding the transit route he / she plans to take via his / her cell phone.

6. The motorist verifies the service status of the transit route by using the interactive response system over the phone and confirms his / her intended transit route is not in service due to power failure.

7. The user changes his / her travel plan and decides to continue his / her journey using the highway.

Scenario 3: Commuter Travelling to a Destination (e.g., Downtown Area)
(Dissemination Methods: web portal and DMS)

1. The user clicks on the highway traffic map showing the real-time traffic conditions. The traffic conditions along the route are acceptable in general. On the screen, majority of the sections along the highway (that leads to the user's destination) is showing "green" – i.e., moving well, or "amber" – i.e., moving slowing. However, one section is showing "red" – i.e., moving very slowly.

2. The user clicks on the incident symbol at that section on the screen. The screen shows that a collision occurred 5 minutes ago blocking 2 lanes.

3. The user switches to the camera map and checks on the real-time CCTV camera images and notes that the ambulance just arrives on the scene. The user clicks on the few cameras upstream of the incident and finds that the traffic volume is starting to build up quickly.

4. The user clicks on the camera icons on one of the alternative routes and finds the traffic conditions along the alternative route are generally acceptable.

5. The user clicks on the travel time screen showing travel times, and checks the estimated travel times for several sections along the routes.

6. The user decides to leave 30 minutes earlier, take the original highway route, exit 2 exits upstream of the incident location then take the alternative route to get to the destination.

7. As the user is driving en-route along original highway route, the DMS upstream of the incident indicates the incident is still blocking 2 lanes. The user exits from the highway then take the alternative route to get to the destination as planned.

Scenario 4: Commuter Travelling to a Ferry Port
(Dissemination Methods: web portal, PDA or in-vehicle unit)

1. The user clicks on the on-line map showing different ferry locations and selects the ferry service the user is interested in.

2. The computer screen displays the ferry schedule and other ferry information such as capacity and restrictions.

3. The user downloads the ferry schedule (static) to his PDA for later reference.

4. The user switches to the traffic map showing the real-time traffic conditions of the highway route. The user finds the traffic conditions along the route leading to the ferry port are acceptable. On the screen, most sections along the highway (that leads to the user's destination) are showing "green" – i.e., moving well, while some of them are showing "amber" – i.e., moving slowing.

5. The user switches to the camera map and checks on the real-time CCTV camera images. The user confirms visually the traffic conditions along the intended route are generally acceptable and incident-free.

6. The user clicks on the travel time screen showing travel times, and checks the estimated travel times for different links along the routes.

7. Based on the ferry schedule he has viewed previously, the user decides to leave immediately and take the highway route to the destination. The user inputs the travel routes into his PDA (or in-vehicle unit).

8. As the user is driving en-route along the highway, he receives an instant updates through his PDA (or in-vehicle unit) regarding a major road blockage downstream on the pre-selected route plan. The PDA (or in-vehicle computer) announces the information to the user via the audio interface.

9. Due to the expected long delay of the incident on the highway, the user exits from the highway and takes the alternative route to get to his destination.

Scenario 5: Commuter Travelling to a Destination in Adverse Weather Conditions and an Occurrence of a Traffic Accident
(Dissemination Method: in-vehicle unit)

1. A motorist is travelling alone to a suburban destination in a winter morning.

2. As the vehicle is approaching a bridge, the in-vehicle unit alerts the motorist of warning about the visibility and icy conditions on the bridge.

3. The motorist responds by reducing his / her driving speed as recommended by the system.

4. After the motorist passes the bridge and visibility improves, he / she resumes his / her normal driving.

5. The in-vehicle unit alerts the motorist of an incident just occurred downstream on his / her route. A message "Major Accident Ahead Warning" is display on the in-vehicle unit and a voice message is announced.

6. A recommended route and the estimated travel time are displayed on the in-vehicle unit.

7. The motorist decides to take the alternative route to his / her destination.

Scenario 6: Commercial Vehicle - Road Closure during Delivery of a Trucking Company
(Dissemination Methods: web portal and in-vehicle unit)

1. A central dispatcher for a trucking company (an ATIS subscriber) received a notification from ATIS via its subscription services that a section of the highway that serves as one of the company's primary routes is closed due to a major accident. Alternative routes are also received together with the notification.

2. Using the automatic vehicle location system the company has, the dispatcher identifies the current location of trucks in that vicinity and sends the information to the drivers regarding the road closure.

3. After receiving the information, a driver informs dispatcher that he is heading toward the planned route (i.e., the closed highway).

4. Dispatcher requests driver to pull over and wait for further instructions.

5. The dispatcher verifies the traffic conditions of the alternative routes via the ATIS web portal, checks on a few CCTV cameras along the alternative routes and confirms the best alternative routes for the driver.

6. The dispatcher contacts the driver and provides the revised route.

7. The driver takes the alternative route as instructed to get to his destination.

9. DEFINITION OF SYSTEM ARCHITECTURE

9.1 The ITS Architecture for Canada

ITS Architecture is a framework for developing and deploying ITS and provides a growth path. It provides a mechanism for depicting the integration and coordination of functional / operational elements of a system. It serves as an information source and provides institutional packages to coordinate deployment effort by public and private organizations. It also provides the guidance in identifying integration opportunities during project definition.

In Canada, the development of the ITS Architecture for Canada has been instigated by Transport Canada. The development process commenced in August 1999 under the direction of an architecture development steering committee comprising representatives of Transport Canada, ITS Canada, provincial agencies and associates, academia and other stakeholder representatives. The development process involves an extensive stakeholder outreach program to solicit input and participation from interested stakeholders. The development works have been based on the following concepts:

- User Services and User Sub-Services;
- Logical Architecture;
- Physical Architecture; and
- Market Packages.

The concept of user services and user sub-services allows the identification of high level services in addressing the specific needs of the users. The functional requirements to accomplish each user service are defined by user service requirements. These requirements can be used as a departure point for the development of project functional requirements and system specifications.

The logical architecture presents a functional view of the ITS user services. It defines the functions or process specifications that are required to perform ITS user services and the information or data flows that need to be exchanged between these functions. Developing a logical architecture, which is independent of institutions and technologies, helps to identify the system functions and information flows, and serves to guide development of functional requirements for new systems and improvements.

The physical architecture represents the physical, versus functional, view of a system where the process specifications identified under the logical architecture are assigned to physical entities and the data flows grouped together into architecture flows. These architecture flows and their communications requirements define the interfaces required between subsystems, which form the basis for ongoing standards work to enable inter-operability of ITS systems and products.

The physical architecture defines four systems: Traveller, Centre, Wayside, and Vehicle, and twenty-three subsystems. The architecture has identified four communication media types to support the communications requirements between the twenty-three

subsystems. They are wireline (fixed-point to fixed-point), wide area wireless (mobile), vehicle to vehicle, and dedicated short range communications.

Market package represents standard groups of like functions in one or more subsystems which are required to work together to deliver a given user service, and the major architecture flows between them and the external entities, the terminators.

Based on Version 1.1 of the ITS Architecture for Canada released in June 2001, 35 user services and 90 user sub-services grouped under 8 user service bundles have been defined.

The inter-connection of the subsystems of ITS Architecture for Canada is illustrated in Figure 9.1. This physical architecture diagram illustrates the inter-connections between the four systems.

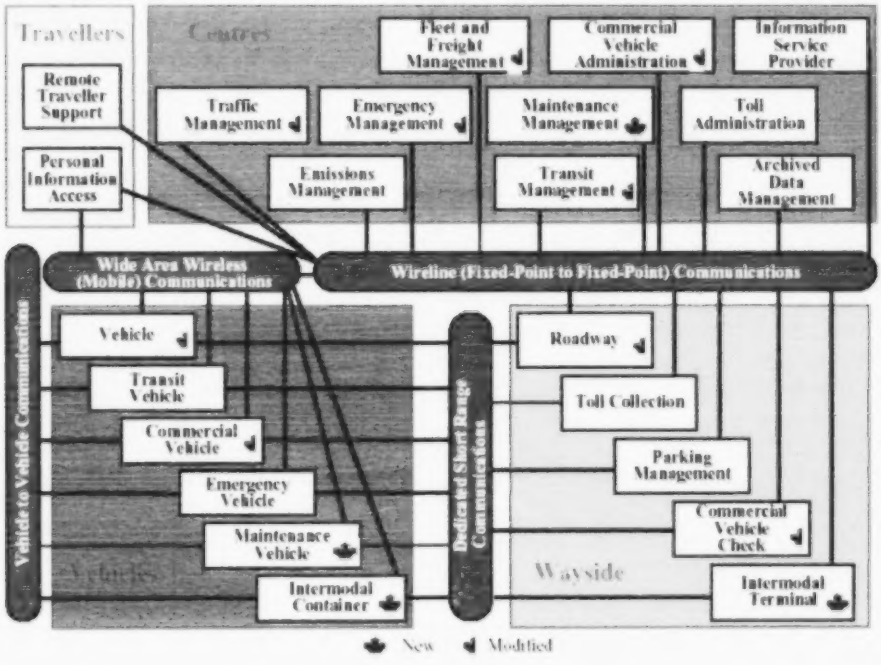

Figure 9.1 : Canadian ITS Architecture Subsystems Inter-connect Diagram

In general, the steps to defining the System Architecture for the Regional ATIS using the ITS Architecture for Canada as a tool include:

- Identifying user services and sub-services to meet the requirements and needs for traveller information within Greater Vancouver;
- Tracing the relevant market packages from the user requirements;
- Modifying the market packages to meet the unique features of the Regional ATIS; and

- Summarizing these market packages with respect to common elements for integration into the overall System Architecture.

9.2 System Architecture Framework

In consideration of the user requirements and the information needs of the various user groups identified under Section 5 of this Report, the following market packages from the ITS Architecture for Canada have been identified as being relevant to meeting the specific needs for the deployment of the Regional ATIS:

- Interactive Traveller Information – This market package provides tailored information in response to a traveller request. Both real-time interactive request / response systems and information systems that provide a tailored stream of information to the traveller based on a submitted profile are supported. The traveller can obtain current information regarding traffic conditions, road conditions, transit services, ride share / ride match, parking management, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required digital communications between traveller and the information service provider. A variety of interactive devices may be used by the traveller to access information prior to a trip or en-route, including phone, kiosk, personal digital assistant, personal computer, and a variety of in-vehicle devices. Successful deployment of this market package relies on availability of real-time transportation data from roadway instrumentation, probe vehicles or other means.

- Broadcast Traveller Information – This market package provides the user with a basic set of ATIS services; its objective is early notification. It involves the collection of traffic conditions, road conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and the near real-time dissemination of this information over a wide area through existing infrastructures and low cost user equipment (e.g., FM subcarrier, DAB, cellular data broadcast). Successful deployment of this market package relies on availability of real-time traveller information from roadway instrumentation, probe vehicles or other sources.

- Traveller Services Payment and Reservation – This market package enhances the Interactive Traveller Information package by making infrastructure provided yellow pages and reservation services available to the user. The same basic user equipment is included. This market package provides multiple ways for accessing information either while en-route in a vehicle using wide-area wireless communications or pre-trip via wireline connections.

- Ride Matching – This market package enhances the Interactive Traveller Information package by adding an infrastructure provided dynamic ridesharing / ride matching capability. In terms of equipment requirements, it is similar to the Traveller Services Payment and Reservation package.

- Autonomous Route Guidance – This market package relies on in-vehicle sensory, location determination, computational, map database, and interactive driver interface equipment to enable route planning and detailed route guidance based on static, stored information. No communication with the infrastructure is assumed or required. Identical capabilities are available to the traveller outside the vehicle by integrating a similar suite of equipment into portable devices.

- Dynamic Route Guidance – This market package offers the user advanced route planning and guidance which is responsive to current conditions. The package combines the autonomous route guidance user equipment with a digital receiver capable of receiving real-time traffic, transit, and road condition information which is considered by the user equipment in provision of route guidance.

- Environmental Information Dissemination – This market package supports the dissemination of roadway and weather data to centres which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travellers.

- Archived Data Mart – This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides the basic data quality, data privacy, and meta data management common to all ITS archives and provides general query and report access to archive data users.

- Archived Data Warehouse – This market package includes all the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional meta data management features that are necessary so that all this data can be managed in a single repository with consistent formats. The potential for large volumes of varied data suggests additional on-line analysis and data mining features that are also included in this market package in addition to the basic query and reporting user access features offered by the ITS Data Mart.

By means of modifying the above market packages to adapt to the unique features and requirements for traveller information within Greater Vancouver, the overall system architecture diagram depicted in Figure 9.3, representing the long term vision and framework of the Regional ATIS.

The system architecture diagram represents the physical architecture in defining the subsystems and terminators, and the architecture flows connecting the various subsystems and terminators that make up the implementation package. Physical entities as follows are defined in the system architecture diagram:

- Subsystems that perform ATIS functions;
- Users, or terminators, who interact with the architecture implementation;
- Other systems outside ATIS which will likely interact with ATIS through interfaces; and
- Other subsystems within the architecture where there may be a multiplicity of implementation of each of the architecture subsystems.

In addition to the physical entities, the communications links in facilitating information transfer required under the architecture flows are generally supported by either wireless or wireline communications. The interfaces are defined as follows:

- Wireline Interface – addresses the information transfer between two fixed entities with use of existing public or private networks that may physically include wireless as well as wireline infrastructure;
- Wide Area Wireless Interface – depicts cell-based wireless infrastructures supporting wide area information transfer; the cell-based air link, from a mobile terminal to one of a set of base stations, provides connections between mobile users or between mobile and fixed network-connected users; and
- Dedicated Short Range Communications – depicts the short range air link used for close proximity transmissions between a mobile user and a base station.

Following the format presented in the ITS Architecture for Canada, the following symbols are represented in the system architecture diagram:

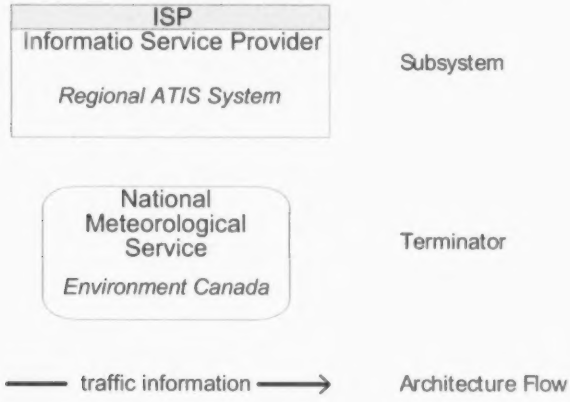

Figure 9.2 : System Architecture Diagram Symbols

9.3 Implementation Phasing

With the multiple information and delivery mechanism in providing traveller information to the travellers, the intent is for the Regional ATIS to be implemented over three distinct phases as follows:

- Phase 1 – Integration of existing information sources and any other feasible sources that come online during the period;
- Phase 2 – Addition of other sources of data as they come online or new information sources as generated by new deployments pursued independently by the member agencies; and
- Phase 3 – ATIS initiatives requiring larger capital investments such as predictive systems; and/or, systems that require a high degree of data fusion from multiple sources and agencies.

Based on the phased implementation approach, the overall system architecture framework has been assessed to identify the subsystems / functions for short, medium and long term implementation in meeting the following objectives:

- Short Term Implementation by March 2005:
  - Deploy regional ATIS infrastructure by means of central data repository (i.e., ATIS server), communication links to agencies, data exchange framework, and data fusion / verification / transformation;
  - Integrate primary data sources with use of existing available data; and
  - Provide web portal to public with "display" information and "my route" information.

- Medium Term Implementation between 2005 to 2007:
  - Deploy mode choice planner tools by means of multimodal route planner and yellow pages;
  - Integrate secondary and new data sources with use of new systems (i.e., advanced traffic management systems, automatic vehicle location systems, parking systems); and
  - Expand dissemination via use of phone, personal digital assistants (PDA), e-mail, kiosk, and other information service providers.

- Long Term Implementation beyond 2007:
  - Deploy more tools by means of travel prediction, travel reservations (i.e., parking, demand transit);
  - Integrate new data sources with use of new systems (i.e., tolling system); and
  - Expand dissemination via use of dynamic message signs and in-vehicle devices.

The results of the assessment are graphically presented as the system architecture diagrams for the short, medium and long term implementation in Figures 9.4, 9.5, and 9.6 respectively. The data sources to be available in respect of the various architecture flows between the stakeholder entities, i.e., between subsystems or between subsystem and terminator or between terminators, are summarized in Table 9.1. The data sources

have also been categorized into priority level for dissemination, i.e., high, medium and low priorities, based on their availability.

The data sources that are to be connected to the web portal under the short term implementation are listed as follows:

- Traffic Management Subsystem:
  - Image capture of traffic cameras;
  - Traffic speed volume and occupancy;
  - Road conditions, incidents, road closures, and road weather;
  - Road construction for major projects;
  - Status of lanes (i.e., Massey Tunnel, Lion's Gate Bridge, Pitt River Bridge);
  - Status of swing bridge (i.e., Pitt River Bridge);
  - Dynamic sign messages;
  - Weigh station information;
  - Airport transportation information; and
  - Border delays.
- Transit Management Subsystem:
  - Transit routes, schedules and fares; and
  - Trip planner.
- Multimodal Transportation Service Provider:
  - Flight schedules;
  - Real-time flight information and notification;
  - Annual cruise schedule;
  - Ferry routes, schedules, fares and service notifications; and
  - Real-time ferry departure and wait times.
- Emergency Management Subsystem:
  - Incident information for Vancouver, Richmond and RCMP for some municipalities.
- Emission Management Subsystem:
  - Air quality forecasts for May-September only.
- Maintenance Management Subsystem:
  - Road conditions and incidents.
- National Meteorological Service:
  - Weather forecasts, weather warnings and radar maps.
- Map Update Provider:
  - Base maps and attributes (i.e., road network, addresses, navigation).
- Personal Information Access Subsystem:
  - Traveller information;
  - Yellow pages information; and
  - Individual transit trip planners.

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
Regional ATIS System ⇔ Traffic Management Subsystem					
S	Ministry of Transportation Massey Tunnel Lane Control System	←	request for traffic information	-	-
		→	traffic information	High	Image capture of traffic cameras Status of lanes DMS messages
				Med	
				Low	
S	Ministry of Transportation Massey Tunnel Congestion Warning System	←	request for traffic information	-	-
		→	traffic information	High	Traffic speed volume & occupancy DMS messages
				Med	
				Low	
S	Ministry of Transportation Lion's Gate Lane Control System	←	request for traffic information	-	-
		→	traffic information	High	Image capture of traffic cameras
				Med	Status of lanes Traffic speed, volume & occupancy
				Low	
S	Ministry of Transportation	←	request for traffic information	-	-

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
	Pitt River Lane Control System TCH-HOV Cameras	→	traffic information	High	Image capture of traffic cameras Status of lanes Status of swing bridge
				Med	
				Low	
S	Ministry of Transportation Cassiar Tunnel Second Narrow Bridge	←	request for traffic information	-	-
		→	traffic information	High	Image capture of traffic cameras
				Med	Congestion data
				Low	
S	Ministry of Transportation ATIS Border Crossing	←	request for traffic information	-	-
		→	traffic information	High	Border delays – on web site Image capture of traffic cameras – on web
				Med	
				Low	
S	Ministry of Transportation Web Cameras Coquihala Highway 5 Whistler Highway 99	←	request for traffic information	-	-
		→	traffic information	High	Web traffic cameras – on web
				Med	
				Low	
S	Ministry of Transportation	←	request for traffic information	-	-

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
	Drive BC ATIS	→	traffic information	High	Road conditions Incidents Road closures Road weather
				Med	
				Low	
S	Ministry of Public Safety Commercial Vehicle Safety and Enforcement Division (CVSE)	←	request for traffic information	-	-
		→	traffic information	High	
				Med	Weigh station information
				Low	
S	City of Vancouver	←	request for traffic information	-	-
		→	traffic information	High	Traffic cameras – on web Road construction – major projects only – on web
				Med	Road maintenance Special events Road closures and maintenance
				Low	
S	Vancouver International Airport Authority	←	request for traffic information	-	-
		→	traffic information	High	Airport information (transportation) – on web (www.yvr.com)

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Med	Road incidents, closures, congestion – future
				Low	
S	Vancouver Port Authority Cameras	←	request for traffic information	-	-
		→	traffic information	High	Traffic cameras - on web
				Med	
				Low	
S	Canada Customs and Revenue Agency	←	request for traffic information	-	-
		→	traffic information	High	Border delay times – on web (www.ccra-adrc.gc.ca)
				Med	
				Low	
S	US Customs and Immigration	←	request for traffic information	-	-
		→	traffic information	High	Border delay times – on web (www.cbp.gov)
				Med	
				Low	
M	Ministry of Transportation Highway 10 & 17 Cameras	←	request for traffic information	-	-
		→	traffic information	High	Image capture of traffic cameras
				Med	
				Low	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
M	Other Municipalities City of Surrey District of North Vancouver City of North Vancouver City of Coquitlam City of Delta City of New Westminster City of Richmond	←	request for traffic information	-	-
		→	traffic information	High	Road construction – major projects only (not all jurisdictions) on web
				Med	Road maintenance Special events Road closures and maintenance
				Low	Traffic cameras – future
L	Ministry of Transportation Sea to Sky Highway Fraser River Crossing Gateway Program Alex Fraser Corridor (91) Highway 99 Queensborough Bridge Trans Canada Highway ITS	←	request for traffic information	-	-
		→	traffic information	High	Image capture of traffic cameras DMS messages
				Med	Road incidents, closures, congestion – future
				Low	
Regional ATIS System ⇔ Transit Management Subsystem					
S	TransLink (Bus, Seabus, Sky Train, West Coast Express)	←	transit information request	-	-
		←	selected routes	-	-
		→	transit and fare schedules	High	Transit routes – on web Transit schedules and fares – on web Trip planner – on web – uses Trapeze database

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Med	
				Low	
		→	transit incident information	High	
				Med	Transit service disruption – future via TransLink customer service
				Low	
S	Vancouver Trolley Bus Service	←	transit information request	-	-
		←	selected routes	-	-
		→	transit and fare schedules	High	Transit routes, schedules and fare
				Med	
				Low	
		→	transit incident information	High	
				Med	Transit service disruptions – future
				Low	
M	Jack Bell RideShare	←	demand responsive transit request	-	-
		→	demand responsive transit plan	High	Real-time vehicle locations
				Med	
				Low	
M	TransLink (HandyDART)	←	demand responsive transit request	-	-

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
		→	demand responsive transit plan	High	Real-time vehicle locations
				Med	
				Low	
M	Inter-regional Bus Services Pacific Coach Perimeter Airporter	←	transit information request	-	-
		←	selected routes	-	-
		→	transit and fare schedules	High	Transit routes, schedules and fare
				Med	
				Low	
		→	transit incident information	High	Transit service disruption
				Med	
				Low	
Regional ATIS System ⇔ Multimodal Transportation Service Provider					
S	Vancouver International Airport Authority Airlines	←	multimodal information request	-	-
		→	multimodal information	High	Flight Schedules – on web Real-time flight information, flight notification – on web
				Med	
				Low	
S	Vancouver Port Authority (Deltaport, Centerm and Vanterm Container	←	multimodal information request	-	-
		→	multimodal information	High	Annual cruise schedule

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
	Terminals)			Med	
				Low	
S	BC Ferries	←	multimodal information request	-	-
		→	multimodal information	High	Real-time ferry departure, wait times - via traffic reporting system Ferry schedules – on web – manual input Service notifications – on web – manual input
				Med	
				Low	
S	TransLink (Albion Ferry)	←	multimodal information request	-	-
		→	multimodal information	High	Ferry route and schedule – on web
				Med	
				Low	
S	Harbour Lynx Ferry False Creek Ferry Aqua Bus	←	multimodal information request	-	-
		→	multimodal information	High	Routes, schedules and fares – on web
				Med	
				Low	
M	VIA Rail	←	multimodal information request	-	-

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
		→	multimodal information	High	Routes, schedules – on web Online planner and booking tool
				Med	
				Low	
M	Amtrak	←	multimodal information request	-	-
		→	multimodal information	High	Routes, schedules – on web
				Med	
				Low	
M	Rocky Mountaineer Rail Tours	←	multimodal information request	-	-
		→	multimodal information	High	Routes, schedules and fares – on web
				Med	Service disruptions
				Low	
M	Helijet Harbour Air Seaplanes	←	multimodal information request	-	-
		→	multimodal information	High	Routes, schedules and fares – on web
				Med	Service disruptions
				Low	
M	Abbotsford Airport	←	multimodal information request	-	-
		→	multimodal information	High	Flight Schedules

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Med	
				Low	
M	BC Cycling Coalition (BCCC)	←	multimodal information request	-	-
		→	multimodal information	High	Cycling route maps – on web
				Med	
				Low	
M	Taxi Companies	←	multimodal information request	-	-
		→	multimodal information	High	Taxi information
				Med	Online tool
				Low	
M	Fraser River Port Authority (Annacis Auto Terminals, Fraser Richmond Site, Fraser Surrey Docks, Fraser Wharves, Seaspan Coastal Intermodal, etc.) North Fraser Port Authority Steveston Harbour Authority	←	multimodal information request	-	-
		→	multimodal information	High	Port information – on web
				Med	
				Low	
Regional ATIS System ⇔ Toll Administration Subsystem					
L	Ministry of Transportation	←	toll data request	-	-
		→	toll data	High	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Med	
				Low	Future toll projects
L	TransLink	←	toll data request	-	-
		→	toll data	High	
				Med	
				Low	Future toll projects
Regional ATIS System ⇔ Parking Management Subsystem					
M	Vancouver International Airport Authority Vancouver Parking Corporation BC Ferries VIA Rail TransLink Imperial Parking	→	parking information	High	Parking locations and rates – on web (www.yvr.com)
				Med	
				Low	Real-time parking information – future
L	Vancouver International Airport Authority Vancouver Parking Corporation BC Ferries VIA Rail TransLink Imperial Parking	←	parking lot data request	-	-
		←	parking reservation request	-	-
		→	parking lot reservation confirmation	High	Parking Management Systems
				Med	
				Low	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
Regional ATIS System ⇔ Emergency Management Subsystem					
S	ECOMM Corporation/PRIME 911 Call Centre for Greater Vancouver Emergency Dispatch for - City of Vancouver - City of Richmond - RCMP (some municipalities)	←	incident information request	-	-
		→	incident information	High	Incident information for Vancouver, Richmond, some RCMP – via Computer Aided Dispatch System (CAD) Plans to dispatch all RCMP & other municipalities
				Med	
				Low	
Regional ATIS System ⇔ Emissions Management Subsystem					
S	Environment Canada	→	air quality information	High	Air quality forecasts – May-September only – on web
				Med	
				Low	
Regional ATIS System ⇔ Maintenance Management Subsystem					
S	Ministry of Transportation	→	roadway maintenance information	High	Road conditions – reported under Drive BC system Incidents – reported under Drive BC system
				Med	
				Low	
S	Roadway Maintenance Contractors	→	roadway maintenance information	High	Road conditions – reported under Drive BC system Incidents – reported under Drive BC system
				Med	
				Low	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
Regional ATIS System ⇔ National Meteorological Service					
S	Environment Canada	→	volume weather information	High	Weather forecasts Weather warnings Radar maps
				Med	
				Low	
Regional ATIS System ⇔ Map Update Provider					
S	BC Digital Road Atlas	←	map update request	-	-
		→	map update	High	Base maps and attributes - road network, addresses, navigation
				Med	
				Low	
Regional ATIS System ⇔ Personal Information Access Subsystem					
S	Web Portal	←	traveller information	High	Provide traveller information
				Med	
				Low	
		←	yellow pages information	High	Yellow pages information – ISP service (TBD)
				Med	Integrate ISP service provider (TBD)
				Low	
		←	trip plan	High	Individual transit trip planners (TransLink)
				Med	Multimodal planner

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Low	
		→	traveller profile	-	-
		→	traveller request	-	-
		→	yellow pages request	-	-
		→	trip request	-	-
		→	trip confirmation	-	-
M	PDA / Phone / Email / Pager	←	traveller information	High	Provide travel information and alerts
				Med	
				Low	
		←	yellow pages information	High	Yellow pages information – ISP service (TBD)
				Med	
				Low	
		←	trip plan	High	Multimodal planner – future
				Med	
				Low	
		→	traveller profile	-	-
		→	traveller request	-	-
		→	yellow pages request	-	-
		→	trip request	-	-
		→	trip confirmation	-	-
Regional ATIS System ⇔ Remote Traveller Support Subsystem					

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
M	Public Information Kiosk	←	traveller information	High	Provide traveller information
				Med	
				Low	
		←	yellow pages information	High	Yellow pages information – ISP service (TBD)
				Med	
				Low	
		←	trip plan	High	Multimodal planner
				Med	
				Low	
		→	traveller request	-	-
		→	yellow pages request	-	-
		→	trip request	-	-
		→	trip confirmation	-	-
L	Dynamic Message Signs	←	traveller information	High	Provide traveller information
				Med	
				Low	
Regional ATIS System ⇔ Vehicle Subsystem					
L	In-Vehicle Device	←	traveller information	High	Provide traveller information
				Med	
				Low	
		←	broadcast information	High	Provide traveller information

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Med	
				Low	
		←	yellow pages information	High	Yellow pages information – ISP service (TBD)
				Med	
				Low	
		←	trip plan	High	Multimodal planner
				Med	
				Low	
		→	traveller profile	-	-
		→	traveller request	-	-
		→	yellow pages request	-	-
		→	trip request	-	-
		→	trip confirmation	-	-
Regional ATIS System ⇔ Media					
S	TV / Radio	←	traveller information for media	High	Provide traveller information
				Med	
				Low	
		→	media information request	-	-
Regional ATIS System ⇔ Yellow Pages Service Providers					
M	Yellow Pages Service	←	travel service request	-	-

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
	Provider	→	travel service information	High	Yellow pages information – ISP service (TBD)
				Med	
				Low	
Regional ATIS System ⇔ Other ISP					
M	BC Automobile Association	←	ISP coordination	High	To Be Determined
				Med	
				Low	
		→	ISP coordination	High	To Be Determined
				Med	
				Low	
M	Event Schedulers	←	ISP coordination	High	To Be Determined
				Med	
				Low	
		→	ISP coordination	High	To Be Determined
				Med	
				Low	
L	Resorts	←	ISP coordination	High	To Be Determined
				Med	
				Low	
		→	ISP coordination	High	To Be Determined
				Med	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Low	
L	BC Parks	←	ISP coordination	High	To Be Determined
				Med	
				Low	
		→	ISP coordination	High	To Be Determined
				Med	
				Low	
L	BC Tourism	←	ISP coordination	High	To Be Determined
				Med	
				Low	
		→	ISP coordination	High	To Be Determined
				Med	
				Low	
L	Private ISP	←	ISP coordination	High	To Be Determined
				Med	
				Low	
		→	ISP coordination	High	To Be Determined
				Med	
				Low	
Regional ATIS System ⇔ Financial Institution					
M	Banks	←	payment request	-	-

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
	Credit Card Centre	→	transaction status	High	Payment for provision of "added-value" travel information
				Med	
				Low	
Regional ATIS System ⇔ Archived Data Management Subsystem					
S	Regional ATIS Archive System	←	traveller archive data	High	Provide archived traveller information
				Med	
				Low	
		→	archive requests	-	-
		→	archive status	-	-
Traveller ⇔ Personal Information Access Subsystem					
S	Web Portal	←	traveller inputs	High	To Be Determined
				Med	
				Low	
		→	traveller interface updates	High	To Be Determined
				Med	
				Low	
M	PDA / Phone / Email / Pager	←	traveller inputs	High	To Be Determined
				Med	
				Low	
		→	traveller interface updates	High	To Be Determined
				Med	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Low	
Traveller ⇔ Remote Traveller Support Subsystem					
M	Public Information Kiosk	←	traveller inputs	High	To Be Determined
				Med	
				Low	
		→	traveller interface updates	High	To Be Determined
				Med	
				Low	
Driver ⇔ Vehicle Subsystem					
L	In-Vehicle Device	←	driver inputs	High	To Be Determined
				Med	
				Low	
		→	driver updates	High	To Be Determined
				Med	
				Low	
Driver ⇔ Location Data Source					
L	GPS Device	→	position fix	High	To Be Determined
				Med	
				Low	
Personal Information Access Subsystem ⇔ Location Data Source					
L	GPS Device	→	position fix	High	To Be Determined

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Med	
				Low	
Payment Instrument ⇔ Personal Information Access Subsystem					
S	Web Portal	←	payment	High	To Be Determined
				Med	
				Low	
		→	request for payment	High	To Be Determined
				Med	
				Low	
M	PDA / Phone / Email / Pager	←	payment	High	To Be Determined
				Med	
				Low	
		→	request for payment	High	To Be Determined
				Med	
				Low	
Payment Instrument ⇔ Remote Traveller Support Subsystem					
M	Public Information Kiosk	←	payment	High	To Be Determined
				Med	
				Low	
		→	request for payment	High	To Be Determined
				Med	

Table 9.1 : System Architecture – Data Source Availability					
Stakeholder Entity		**Architecture Flow**		**Date Sources**	
				Low	

Legend:

Proposed Implementation Term
- S – Short Term
- M – Medium Term
- L – Long Term

Architecture Flow Direction
- ← To Entity
- → From Entity

Data Dissemination Priority
- High – High Priority
- Med – Medium Priority
- Low – Low Priority

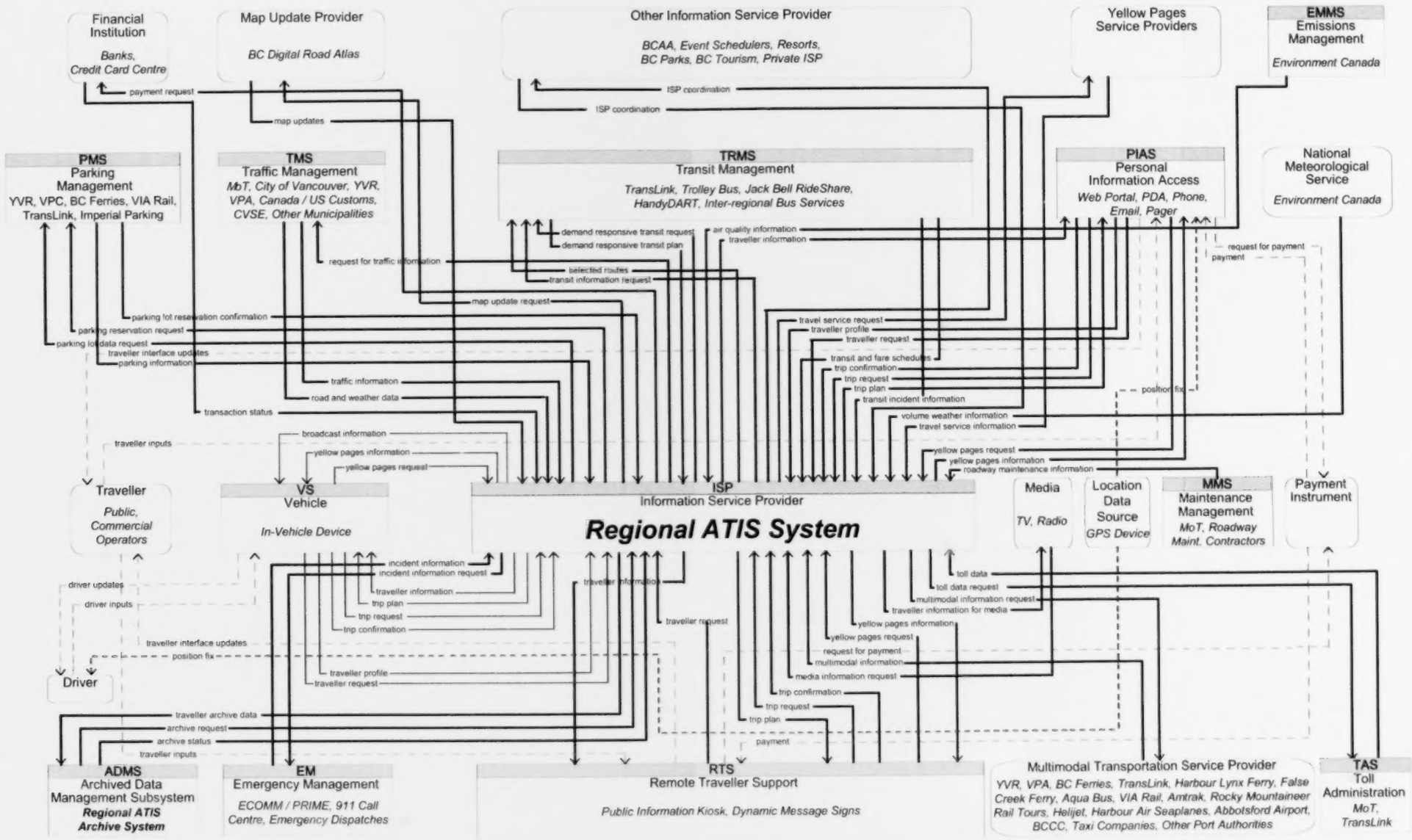

FIGURE 9.3
OVERALL SYSTEM ARCHITECTURE DIAGRAM

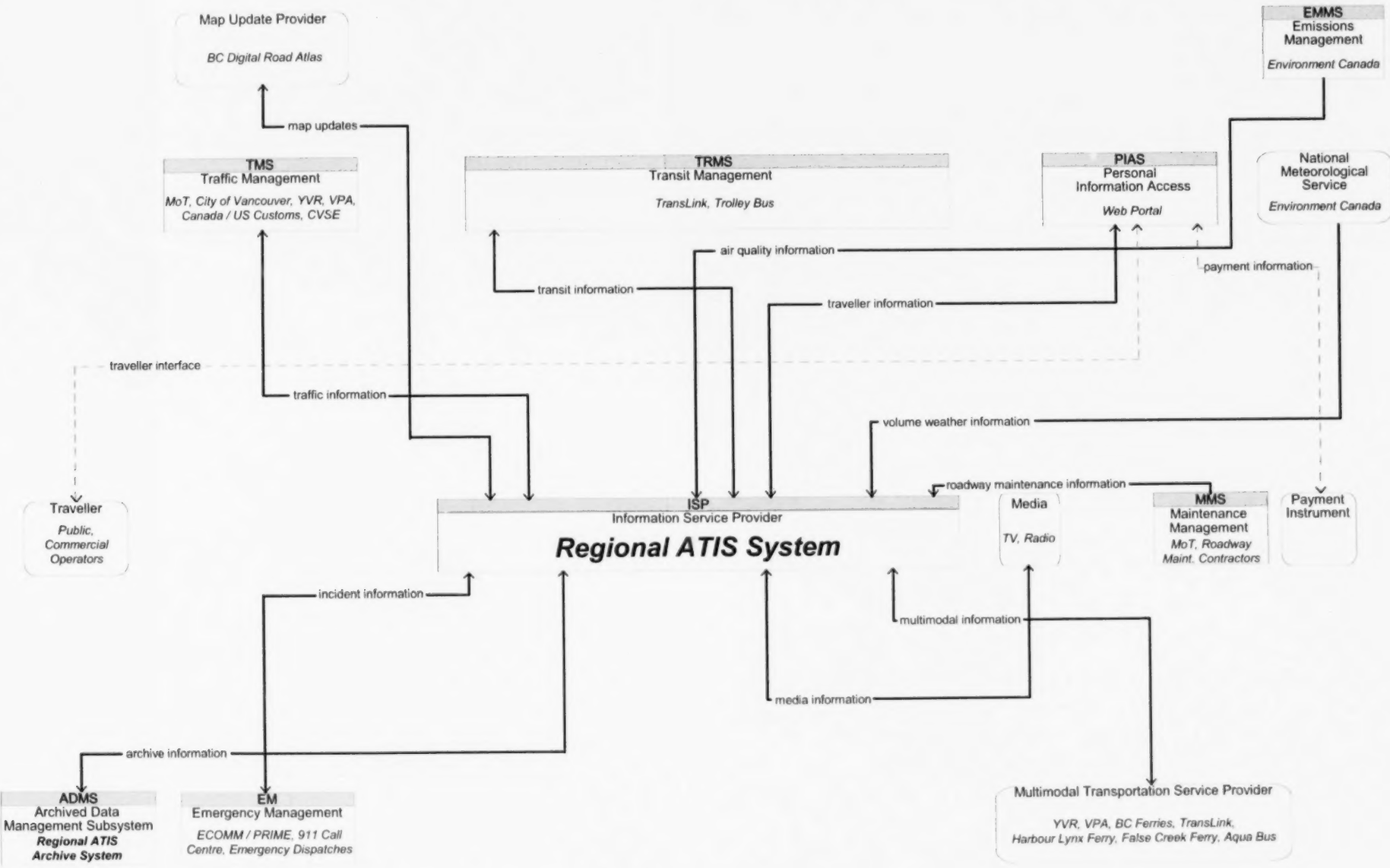

FIGURE 9.4
SYSTEM ARCHITECTURE DIAGRAM (Short Term Implementation)

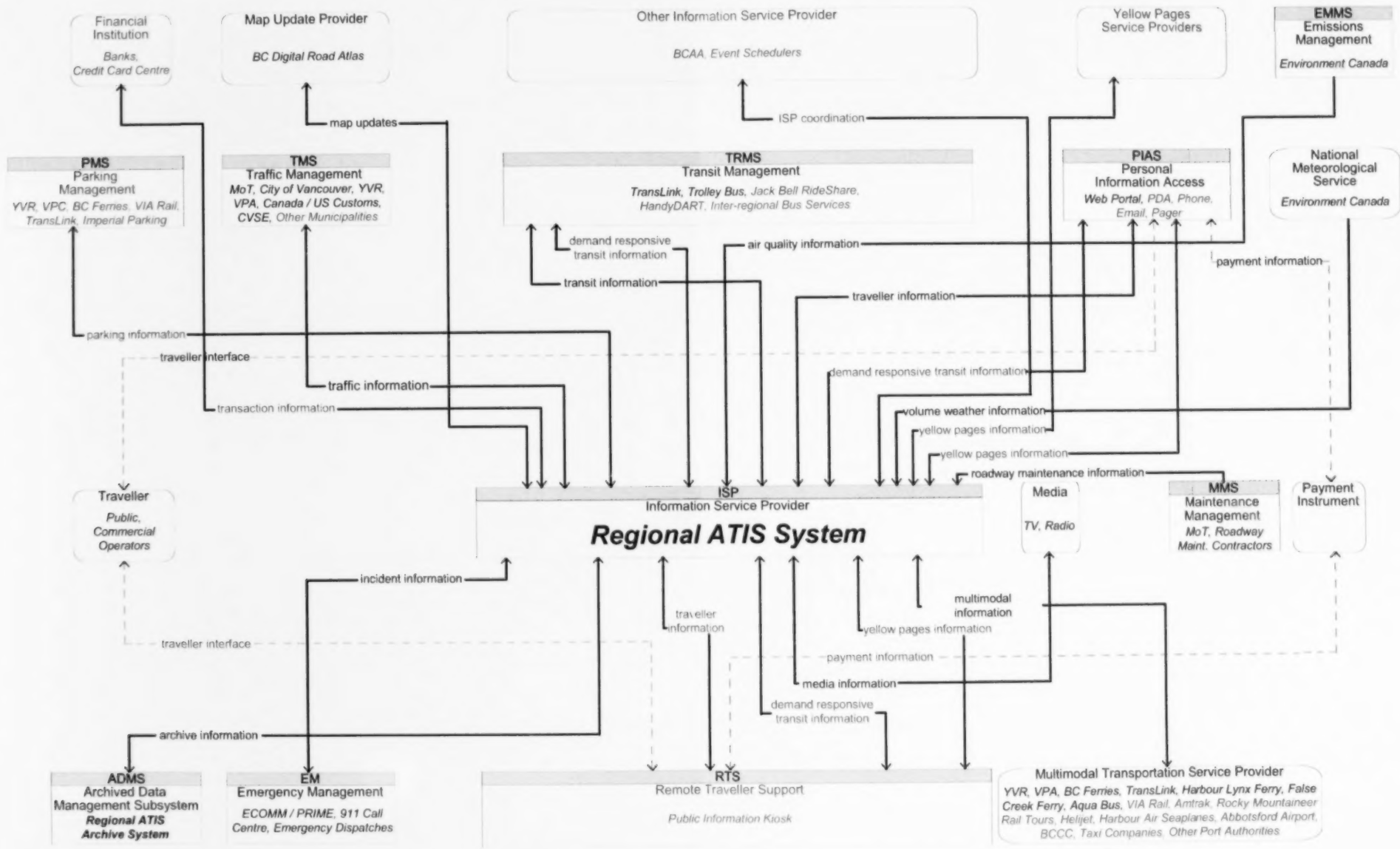

FIGURE 9.5
SYSTEM ARCHITECTURE DIAGRAM (Medium Term Implementation)

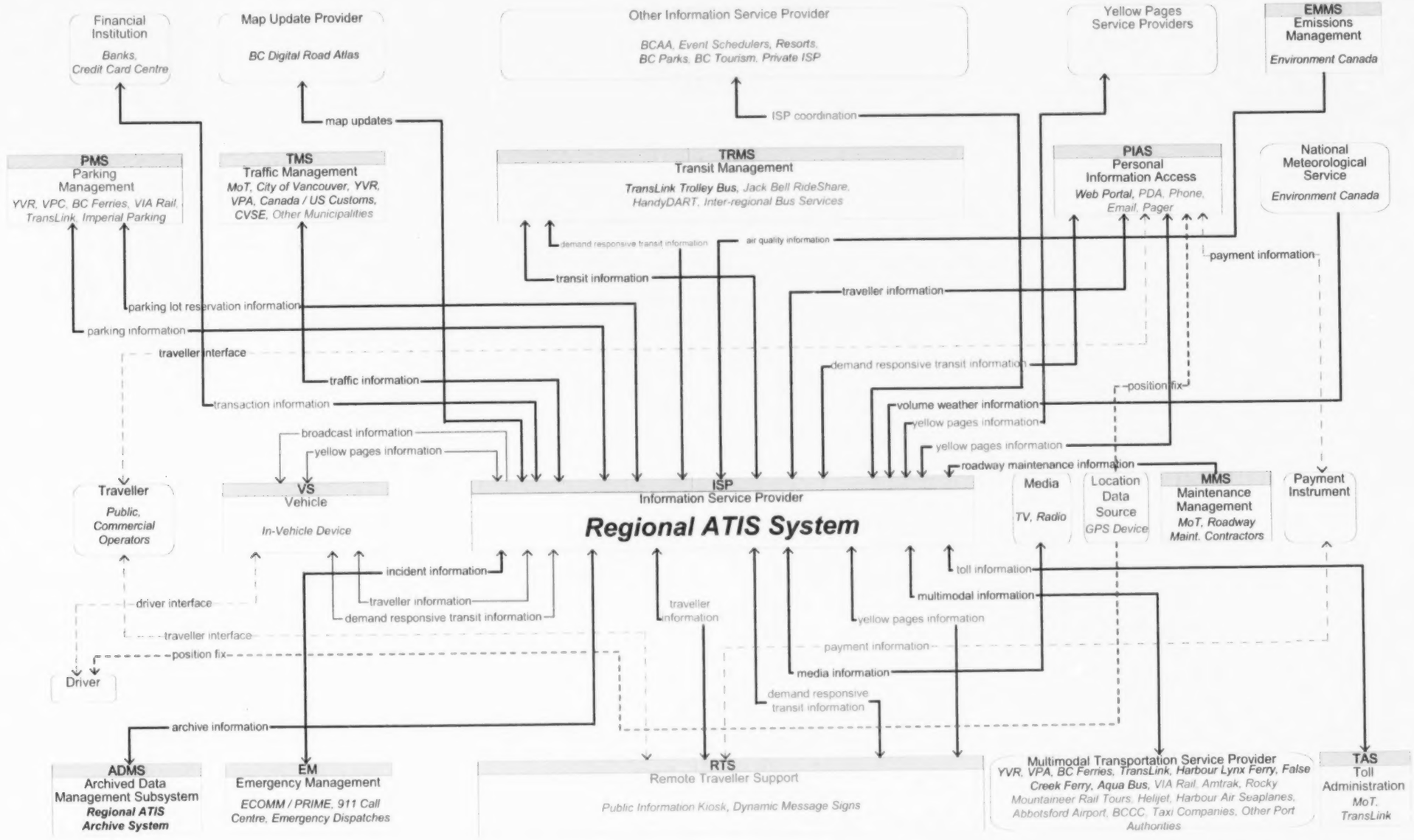

FIGURE 9.6
SYSTEM ARCHITECTURE DIAGRAM (Long Term Implementation)

TRANS LINK

Regional Advanced Traveller Information Systems

APPENDIX IV
System Design

Final
July 30, 2004

DELCAN

IN ASSOCIATION WITH

Pangaea

PBA
Consulting
Engineers

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1.0 INTRODUCTION

1.1 Background

The Greater Vancouver Transportation Authority (also known as TransLink) was created in 1999, and is responsible for planning, financing and operating a regional transportation system that moves people and goods efficiently, and supports the regional growth strategy, air quality objectives and economic development of the Greater Vancouver Regional District (GVRD).

Despite a comprehensive network of multi-modal transportation links, the GVRD's transportation system faces many challenges. The ITS Corporation of British Columbia was established, as a subsidiary of the Greater Vancouver Transportation Authority ("TransLink"), to define an ITS program and guide the development and implementation of ITS projects in the region and province.

In November 2001, the Province of British Columbia, with Transport Canada and the ITS Corporation, completed the BC Provincial Intelligent Transportation Systems (ITS) Vision and Strategic Plan for using advanced technologies to help solve provincial, regional and local transportation issues. This plan provides overall directions for the deployment of ITS within the Province of British Columbia by identifying 23 initiatives that provide the steps to achieving the Province's ITS strategies.

As part of the initiative to examine areas of interest to determine the "next step" for joint projects, the ITS Corporation has instigated the development of a concept of operation for a regional advanced traveller information system (ATIS) for Greater Vancouver.

Advanced Traveller Information Systems (ATIS) are designed to use advanced systems and technologies to manage information to help drivers decide when to drive and the route to drive, as well as opportunities to reserve rides and other traveller services. The systems make use of information and communication technologies to deliver information to a wide range of Travellers who use different modes of travel and have a wide variety of characteristics. Information enables users to make better travel choices and supports better use of existing transportation facilities. Such systems have the potential to improve the operation of the transportation network and raise the perceived quality of the user's experience through the provision of good usage and option information.

The regional ATIS for Greater Vancouver is one that will gradually develop over time as the availability of information (such as real time as well as planned transit schedules, incident detection, etc.,) becomes more widely available and dependable. The intention of the project is to develop a concept of operation for a regional ATIS for Greater Vancouver area and demonstrate the feasibility of the system through a first phase implementation.

The project will take advantage of the ITS Corporation's structure to bring together the efforts of many existing regional agencies to create an integrated and unified regional traveller information service. The primary objective of the project is therefore to provide a traveller information system for the Greater Vancouver area that makes use of multiple information delivery systems to provide trip information to the user, when and where it is required, in the appropriate format, and with the appropriate content and timing, to effectively support travel decisions such as choice of mode, choice of route and timing of the trip.

1.2 Scope

The purpose of this document is to present the proposed system design for the Regional ATIS. Using a system development approach, system design will satisfy the needs and requirements stated in the concept of operations and system architecture for the first phase of the deployment.

In the objective of the first phase deployment is to gather and fuse traveller information from existing data sources in the GVA and provide a web portal to disseminate the information to the public. In future phases, the regional ATIS will gather information from new data sources, provide enhanced functions (i.e. multi-modal planning tools) and disseminate through other means(i.e. ISP's, IVR, e-mail, DAB). For a complete description of the deployment phases refer to the Functional Design – Working Paper.

1.3 Glossary

ATIS	Advanced Traveller Information Systems
Axis	Apache's Implementation of SOAP
C2C	Center to Center
CARS	Conditional Acquisition Reporting System
CCTV	Closed Circuit Television
CMS	Content Management System
CORBA	Common Object Request Broker Architecture
DATEX	Data Exchange
DEN	Data Exchange Network
FTP	File Transfer Protocol
HTTP	HyperText Transfer Protocol
HTTPS	Secure HyperText Transfer Protocol
IDL	Interface Definition Language
IP	Internet Protocol
ISPs	Information Service Providers
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
IVR	Interactive Voice Recognition
NTCIP	National Transportation Communication for ITS Protocol
SAE	Society of Automotive Engineers
SMTP	Simple Mail Transfer Protocol
SOAP	Simple Object Access Protocol
SSL	Secure Sockets Layer
TCP/IP	Transmission Control Protocol and the Internet Protocol
TMDD	Transportation Management Data Dictionary
UDDI	Universal Description Discovery and Integration
UDP	User Datagram Protocol
W3C	World Wide Web Consortium
WSDL	Web Services Description Language
XML	eXtensible Markup Language

XSL	eXtensible Stylesheet Language
XSLT	eXtensible Stylesheet Language Transform

1.4 References

Project:

- TransLink Regional ATIS – Technical System Inventory Report
- TransLink Regional ATIS – Functional Design Working Paper

Standards:

- ITE/AASHTO Traffic Management Center Standard, Standards for Traffic Management Center to Center Communications, Volume II: Message Sets, Version 1.5 (Provisional Standard), December 15, 2003.
- ITE/AASHTO Traffic Management Center Standard, Standards for Traffic Management Center to Center Communications, Volume II: Companion Annexes, Version 1.5 (Provisional Standard), December 15, 2003.
- SAE J2354 – Message Sets for Advanced Traveller Information System (ATIS), April 2002.
- NTCIP 9010 - XML in ITS Center-to-Center Communications - User Comment Draft – v1.07, October 2003
- World Wide Web Consortium Standards (HTML, HTTP, XML, SOAP, WSDL, etc) http://www.w3.org/

Others:

- CARS System Overview – October 16, 2003

2.0 ATIS SYSTEM OVERVIEW

The system design for the initial deployment of the Regional ATIS will consist of the following major components:

- Web Portal System
- Database Management System
- ATIS Data Exchange Network (DEN)
- Content Management System (CMS)
- Agency Interfaces and Upgrades
  - MoT
  - GVA Cities (CARS)
  - Prime (ECOMM)
  - BC Ferries
  - Environment Canada

A system diagram is provided in Appendix A – Diagrams.

The web portal system provides the primary public access to the Regional ATIS. The web portal will present traveller information that has been gathered from other agency's systems and web sites. The information will be gathered through defined interfaces to the agency's system using ITS center-to-center (C2C) protocol standards where possible. Where limitations exist, interfaces to legacy protocols will be utilised. The ATIS data exchange network (DEN) will manage the gathering of information using either C2C standard or legacy protocols through a gateway. The gateway will filter and fuse the information from each agency and store the result in a common format in the database management system.

The content management system provides the tools for the management and organisation of the content presented on the web portal.

The Regional ATIS will obtain traveller information through the external interfaces to other agency's existing systems. Some of the agencies system required upgrades to publish information to the ATIS. The following table identifies the agency systems proposed to be integrated in the first phase implementation and type of upgrades required:

Agency	Data	Upgrades Required
MoT – George Massey Tunnel	CCTV images, Lane Status, Traffic Data, VMS Messages	Upgrade to publish data from Lane Control System and CCTV system to Regional ATIS using DEN
MoT – Lion's Gate Bridge	CCTV images, Lane Status,	Upgrade to publish data from existing Lane Control and CCTV system to Regional ATIS using DEN
MoT – Pitt River Bridges	CCTV images, Lane Status, Swing Bridge status	Upgrade to publish data from existing Lane Control and CCTV systems to Regional ATIS using DEN

Agency	Data	Upgrades Required
MoT – Cassiar Tunnel	CCTV images, Traffic Data,	Upgrade to publish data from existing CCTV system and traffic detectors to Regional ATIS using DEN
MoT - Border ATIS	CCTV images, Border Delays	Send data to Regional ATIS using DEN
MoT –Drive BC	Incidents, Road Conditions, Weather, Closures	Send data to Regional ATIS using DEN
Prime (ECOMM)	Traffic Incidents, Hazards, Safety Warnings	Upgrade to filter and publish data from existing Records Management System to Regional ATIS using DEN
BC Ferries	Current Departures	None
Environment Canada	Weather Forecasts, Air Quality Indices,	None
GVA Cities	Construction, Maintenance, Special Events	Provide a system for data entry and reporting of events. Send data to Regional ATIS using DEN.

3.0 SUB-SYSTEMS

3.1 Web Portal System

The web portal system will be Regional ATIS's primary interface to the public in the first phase deployment. The web portal will provide a single web presence to access traveller information available from other agencies systems and obtained from their traveller information web sites. The traveller information sources have been identified in the functional design.

An enterprise portal is a strategic IT initiative that utilizes existing applications and infrastructure, in combination with software development in order to:

- Increase operational efficiencies
- Automate manual processes
- Decrease administrative costs

A portal can include tools like web-based collaboration, content management, business intelligence and reporting, document management, system integration, and ERPs. All of these items and many others are potential components of portals, and may be deployed together or separately.

The Regional ATIS web portal will be used to present traveller information in Greater Vancouver, solving two challenges. First, the portal will provide a single point of access to information and tools that are designed to help travellers but are based on disparate technology platforms. Examples of these tools include the Trip Planning tool and the Arrival and Departure time information linked to within the YVR web site. Secondly, the portal will present a common look for traffic congestion and CCTV data collected from a variety of third parties, all presenting their data in uncommon formats. In subsequent phases, the portal will evolve to include additional content and applications.

The ATIS architecture will include a web portal server, content management server and a database server running on separate server computers. Both the portal application server and CMS server will use the database server to retrieve data and content to present to the user.
The expectation is that these three servers will be located in the same physical space with the goal of reducing the communication time between machines when presenting content through the portal. This is critical when presenting real-time or near real-time data to the user community, specifically in the case of the incident and congestion information through the interactive map.
A significant area of concern that impacts the final architecture is performance. It is entirely likely that multiple portal and CMS servers will be required to handle the load at peak traffic times during both the morning and evening rush hours.

The final technical design will be architected in such a way that it may be scaled to accommodate both the performance of the application and the growth of the portal over time. This design allows content from both the portal server and CMS server to be presented seamlessly to the user. It is assumed that all servers will be mirrored or clustered for full redundancy and fail over.

In is noted that Translink's corporate database platform of choice is Microsoft SQL Server. The CMS and portal technology have yet to be decided upon, but the ultimate choice will have to be

compatible with SQL Server. The majority of CMS tools on the market today are compatible with SQL Server, so the Technical Committee has a number of options to choose from. It has been noted that Translink uses the Maestro CMS tool internally. The ultimate selection of a CMS tool to build the RATIS Portal on must be made prior to the completion of the design.

The hosting of the ATIS portal system could be managed by the ATIS operating agency or by a third party Internet Service Provider. This remote hosting approach would allow the web portal to be hosted with a service provider with existing web infrastructure to guarantee a high quality of service, performance and reliability. Basically, it will allow for rapid deployment and expansion of the ATIS as the service provider will be better able to increase web infrastructure as the web portal experiences increase public use.

3.2 Database Management System

The ATIS Database Management System (DMS) Server will contain the main repository of the traveller information obtain from other agencies through the ATIS data exchange network (DEN).

The DMS will be responsible for:

- storage of current traveller information
- storage of spatial data
- storage and archival of historical traveller information
- data management server to other ATIS applications
- data management services to the web portal

The information stored in the ATIS will be obtained from the other agency's systems through the ATIS data exchange network.

The database management system be will be Microsoft SQL Server, which is TransLink's corporate database standard.

3.3 ATIS Data Exchange Network (DEN)

The Regional ATIS will support two methods of obtaining information from existing systems, a standard interface based on the ITS architecture for Canada and legacy interfaces. The legacy interfaces are needed to connect to systems that have either technical or institution limitations and therefore cannot support the standard interface.

The standard DEN interface will manage the exchange of traveller information messages between systems based on existing approved or developed standards in the ITS community and will cover:

- Message dialogues and the structure of the messages
- Definition of the data elements in the message. Data elements are defined in a data dictionary
- Method to encode the data elements
- Transmission protocol to transmit the message

The ITS Architecture for Canada identifies the North American communications and protocol standards. The main communications standards that will apply to the ATIS are under development by ITE, SAE and the IEEE. Specifically, the standards that would apply are:

- SAE J2353 Advanced Traveller Information System (ATIS) Data Dictionary. A minimum set of media-independent data elements needed by potential information service providers to deploy ATIS services and provide the basis for future inter-operability by ATIS devices.

- SAE J2354 Advanced Traveller Information System (ATIS) Message Set. A basic message set, using the data elements from the ATIS Data Dictionary standard, needed by potential information service providers to deploy ATIS services and provide the basis for future inter-operability for ATIS devices. The standard identifies message groups:

  - Setting - send traveller preferences to an ISP
  - Directory Services - "Yellow Pages"
  - May day
  - Parking – parking facility occupancy, space availability and costs
  - Traveller Information - traffic, incidents, events, weather, air quality, transit schedules, flight schedules
  - Trip Guidance - route planning, travel modes, points of interest

- ITE Advanced Traffic Management Systems (ATMS) Data Dictionary (TMDD). A data dictionary for traffic management applications. Describes and standardizes roadway links and nodes (i.e. location information) for incidents and traffic-disrupting roadway events. Includes data elements for traffic control, traffic detectors, actuated signal controllers, traffic modeling, vehicle probes, ramp metering data, dynamic message signs (DMS), video and camera control, parking management and weather stations.

- ITE Message Set for External TMC Communication (MS/ETMCC). A message set standard for communication between traffic management center (TMC) and other ITS centers. Including other traffic management centers, information service providers, emergency management centers, emissions management centers and transit management centers. The standard contains six message groups:

  - Roadway-Network - static roadway description
  - Network-State - static and dynamic link & node information
  - Network-Events - incidents, scheduled events, event response
  - Traffic-Requests - request for traffic info
  - Traffic-Device-Status - DMS, RMS, CCTV, HAR, signal status
  - Traffic-Control - control traffic device

In addition there is a proposed addendum to the MS/ETMC2 standard to incorporate a single general event message that would convey information relating to a single travel situation. This event report message (ERM) format has been developed and in use in systems such as the Condition Acquisition and Reporting Systems (CARS).

- IEEE 1512 "Standard for Common Incident Management Message Sets for Use by Emergency Management Centers" (IM). Defines message sets for information exchange among emergency management centers, such as first responders, incident command posts, public safety dispatch centers, hazardous material response centers, emergency management centers, etc. The standard does not define a data dictionary; the TMDD is utilized, but the message sets and data elements for information exchange. This standard is typically implemented with applications operating in both the emergency management and transportation management domains.

- NTCIP Centre-to-Centre (C2C) Protocols. A family of communications standards and specifications to facilitate the exchange of transportation information between agency operation centres. Currently within the centre-to centre family of protocols, two approved application level protocol choices exist, CORBA and DATEX-ASN, however the C2C working group is developing a XML based approach.

The Enterprise ITS Internet project defined a data exchange model based on the emergence of the XML family of protocols standardized by the World Wide Web Consortium (W3C). The NTCIP C2C working group is currently developing a C2C protocol based on XML and is favouring two approaches 1) web services approach using the W3C standard web services architecture (WDSL, SOAP and HTTP) and 2) file transfer approach using FTP or HTTP.

The file transfer approach is a simple transfer of an XML formatted message between two systems using a file transfer protocol, usually FTP or HTTP, to transmit the file. This is a unidirectional approach where the receiver has the responsibility for obtaining the information and there is no built-in command or control capability, however, it is a simple, low cost and low complexity approach.

The web services approach uses Universal Description Discovery and Integration (UDDI) to locate the publisher of the information and the Simple Object Access Protocol (SOAP) over HTTP to support the exchange of messages. SOAP provides a standard method to structure XML messages, provides conventions for message dialogues and defines the how to send the messages. This approach supports multiple message passing paradigms, so the developer can choose either request/response, publish/subscribe, or fire and forget methods.

The following diagram summarises the DEN in the context of the ISO OSI seven (7) layer model

OSI Layer	Area	XML Direct	Web Services
Application	Software Applications	TMDD, ATIS, IM	TMDD, ATIS, IM
Presentation		XML	XML, WDSL
Session		HTTP,FTP	HTTP, SOAP
Transport	Communications Equipment	TCP, UDP	
Network		IP	
Data Link		Ethernet	
Physical	Cabling	Fibre, Twisted Pair, Wireless	

The ATIS DEN will use the XML Direct method and in the future allow migrate to the web services method. Using XML Direct we need to define:

- the location and naming convention of the files
- specify the update frequency
- specify what messages will be in each file
- specify which protocol will be used (i.e. HTTP or FTP)
- specify access and security (i.e. user & password, encryption)

In order to support the DEN a XML data schema will need to be defined using the message structure and data elements from the ITS TMDD ATIS and IM standards.

ATIS DEN Gateway

A gateway will be provided to support the DEN. This gateway will be responsible for obtaining the information from the other agency's systems, filtering, fusing and storing the information in the database.

Agency	Data	Data Fusion Requirements
MoT – George Massey Tunnel	CCTV images Lane Status, Traffic Data, VMS Messages	Data will be transmitted in DEN format Transform traffic data to levels of congestion
MoT – Lion's Gate Bridge	CCTV images Lane Status,	Data will be transmitted in DEN format
MoT – Pitt River Bridges	CCTV images Lane Status, Swing Bridge status	Data will be transmitted in DEN format

The following diagram summarises the DEN in the context of the ISO OSI seven (7) layer model:

ISO Layer	Area	XML Direct	Web Services
Application	Software Applications	TMDD, ATIS, IM	TMDD, ATIS, IM
Presentation		XML	XML, WDSL
Session		HTTP,FTP	HTTP, SOAP
Transport	Communications Equipment	TCP, UDP	
Network		IP	
Data Link		Ethernet	
Physical	Cabling	Fibre, Twisted Pair, Wireless	

The ATIS DEN will use the XML Direct method and in the future allow migrate to the web services method. Using XML Direct we need to define:

- the location and naming convention of the files
- specify the update frequency
- specify what messages will be in each file
- specify which protocol will be used (i.e. HTTP or FTP)
- specify access and security (i.e. user & password, encryption)

In order to support the DEN a XML data schema will need to be defined using the message structure and data elements from the ITS TMDD ATIS and IM standards.

ATIS DEN Gateway

A gateway will be provided to support the DEN. This gateway will be responsible for obtaining the information from the other agency's systems, filtering, fusing and storing the information in the database.

Agency	**Data**	**Data Fusion Requirements**
MoT – George Massey Tunnel	CCTV images, Lane Status, Traffic Data, VMS Messages	Data will be transmitted in DEN format. Transform traffic data to levels of congestion.
MoT – Lion's Gate Bridge	CCTV images, Lane Status,	Data will be transmitted in DEN format.
MoT – Pitt River Bridges	CCTV images, Lane Status, Swing Bridge status	Data will be transmitted in DEN format.

Agency	Data	Data Fusion Requirements
MoT – Cassiar Tunnel	CCTV images, Traffic Data,	Transform traffic data to levels of congestion.
MoT - Border ATIS	CCTV images, Border Delays	Data will be transmitted in DEN format.
MoT –Drive BC	Incidents, Road Conditions, Weather, Closures	Transform to DEN format and filter for events in GVA.
Prime (ECOMM)	Traffic Incidents, Hazards, Safety Warnings	Transform to DEN format and filter for events in the GVA
BC Ferries	Current Departures	Data will be transmitted in BC Ferries legacy format. Transform to DEN format
Environment Canada	Weather Forecasts, Air Quality Indices,	TBD. Transform to DEN format
GVA Cities	Construction, Maintenance, Special Events	Data will be transmitted in DEN format.

3.4 Content Management System (CMS)

The content management system (CMS) will provide functionality to address web site content creation; content publishing; and controlled access to published content. A commercial CMS tool will be used to provide the CMS functionality.

A CMS will allow authors to build and contribute rich web content. Web content management is driven from the template principle. The author can create the content in variety of tools like Word or other graphic tools and then submit the content into CMS using templates. A commercial CMS tool will be used to provide the CMS functionality.

Templates are created with predefined containers and designated areas that will house text, pictures, navigation items, links and other presentation items. Each container is placed in a pre-defined location on the page and has a pre-defined authoring capability. Some containers are accessible to authors, such as main-body text containers, while others are under the control of system administrators or branding authorities, such as in the area of branding or navigation.

Templates are designed to display "types" of content based on the presentation style. Generally speaking, there are two types of templates (each with a number of variants). The first type handles section to section navigation (often viewed as a page with links) and the second handles text and graphic presentation. The general project approach is to work with authors and administrators to examine the various content presentation styles and determine and design the appropriate number of templates for the solution.

After the templates have been created, authoring content is straightforward. An author will simply select the template they wish to use, enter their content in the appropriate location and choose a

location within the overall web site for the page to exist. The rest of the page, such as navigation and branding, will be assembled automatically.

Once content is submitted or revised within the CMS tool, an approval workflow process is initiated. The CMS uses the concept of role based approval. Generally the roles that are available include authors, editors, moderators and administrators, although they vary from tool to tool. Authors are allowed to create content and submit it for approval. Editors can review the content and then choose to reject, edit, or approve the content. Moderators are allowed to review the content and then reject or approve it. Administrators can perform all of the previously mention as well as manage the overall site structure and function. Authors, Editors, Moderators and Administrators can be informed of approval status by email, or through a work list, which shows the status of content currently being worked on.

The CMS tool will also have the ability to schedule when content starts or stops being published. This allows the content authoring and approval process to be completed prior to the publishing date and have CMS automatically migrate the content to the live site at a predetermined time and if desirable automatically remove and archive.

Business-level users (requiring no HTML knowledge) may also use this publishing environment to easily define collaborative work areas and to publish their business documents. Each user will be able to follow a series of steps defining content, adding attributes, and publishing to a page with content classification. A review and approval process of all content, including notifications that can be sent to each approver indicating the action that is required, is a standard feature of many CMS tools.

4.0 AGENCY INTERFACES AND UPGRADES

4.1 Ministry of Transportation

The Ministry of Transportation (MoT) currently collects and disseminates traffic information at its Local Operations Centers and at the Provincial Highway Conditions Center. This report provides a description of the equipment and methods to provide for the delivery of the MoT's traveller information to the Regional Advanced Traveller Information System (RATIS) web site. Traveller information under consideration for viewing on the RATIS web site includes traffic images, dynamic message signs (DMS), traffic flow information and lane control system status information. Traveller information will be provided for the following MoT systems:

- George Massey Tunnel Counterflow System.
- Cassiar Tunnel, Second Narrows Bridge and Trans-Canada Highway from Cassiar to 160th interchange.
- Lions Gate Bridge Reversible Lane Control System.
- Pitt River Bridge Counterflow System.
- Provincial DMS control system.

Each system will post information to the RATIS gateway using XML formatted files. The connection will be made over the internet using ADSL.

A detailed drawing of the connection of MoT Facilities is provided in Appendix A.

The following sections provide a description of work necessary to access traveller information from each of these systems.

4.1.1 George Massey Tunnel

The Massey Tunnel Counterflow System was upgraded in 2003. The surveillance system was left as is, except for the user interface, which was upgraded with the Cameleon camera control software. In addition, a congestion warning system was installed in 2003 to warn drivers of queues when approaching the tunnel.

It is proposed that camera images, DMS sign status, traffic flow information and lane control system status be provided for viewing on the RATIS web site.

A project is currently underway by City TV to install 2 cameras at the Alex Fraser Bridge and 2 cameras at the Patullo Bridge that will be transmitted back to the control room by microwave. The work required to allow this information to be presented is summarized as follows:

- Provide a camera system client to process the image captures and present them to the RATIS gateway using an existing ADSL router.
- The video matrix switch was not upgraded during the lane control system upgrade and has no spare outputs. The CCTV client requires one output for posting the images to the site. It is

recommended that the switch be upgraded to meet this requirement and for future expansion of the CCTV system.

- The Cameleon drivers will require upgrades to enable publishing of XML formatted information to the ATIS gateway. An additional driver for the lane control PLC is required to provide the lane control system status information to the gateway.
- Update the software on each machine to Cameleon version 4 to provide the FTP functionality for the camera images.

4.1.2 Lions Gate Bridge

It is proposed that camera images and lane control system status information be provided for viewing on the RATIS web site. The Lions Gate system requires minor changes as follows:

- Provide a camera system client to process the image captures and present them to the RATIS gateway using an existing ADSL router.
- Update the software on each machine to Cameleon version 4 to provide the FTP functionality for the camera images.
- A driver to interface Cameleon with the lane control PLC is required to provide the lane control system status information to the gateway.

4.1.3 Pitt River Bridges

The Pitt River Bridges lane control system was installed in 1995. It is proposed that camera images, lane control system status information and bridge status information be provided for viewing on the RATIS web site. The work required to allow this information to be presented is summarized as follows:

- Provide a camera system server and client to control cameras and present the images to the RATIS gateway using an existing ADSL router.
- A driver to interface Cameleon with the lane control and swing bridge PLC's is required. This will provide the lane control system and bridge status information to the gateway.
- A new driver is required to enable the existing lane control system software to function with the Cameleon software.

4.1.4 Cassiar Tunnel

A project is currently underway by the MoT to connect the existing freeway service patrol cameras located on Route 1 between Boundary Interchange and the Cape Horn Interchange to the Cassiar Tunnel control room. The work will integrate the Route 1 cameras with the tunnel system cameras and the Second Narrows Bridge cameras. Once this is done, only minor work will be required to provide the camera images to the RATIS web site. In addition, traffic detection stations are located in the tunnel and it is proposed that this information be provided on the web site. The work required to allow this information to be presented is summarized as follows:

- Provide a camera system client to process the image captures and present them to the RATIS gateway using an existing ADSL router.

- Provide small PLC's to perform the traffic monitoring function and update the driver to present the information to the web site. The cost estimate for this item assumes that the existing detector stations are fully operational.

4.1.5 Provincial DMS System

The MoT recently upgraded the Provincial DMS system using the Cameleon software. It is proposed that various DMS in the Lower Mainland be presented for viewing on the web site. The existing DMS drivers require updating to allow for publishing the sign information to an XML formatted file.

A detailed layout drawing of the Provincial DMS system is provided in the Appendix A.

4.1.6 Border ATIS

The Border ATIS system will provide congestion information and CCTV images from cameras on Hwy 15 and 99 approaches to the Peace Arch and Pacific Highway Border Crossing. The data will be published in XML format available from the Border ATIS system via the ATIS gateway.

4.1.7 Drive BC

The Drive BC system will provide incidents, road conditions, closures and weather events defined on the provincial highways. The events published from the Drive BC system will be unplanned events, planned events and road conditions.

Unplanned Events:

- Event ID#
- Date/time
- Reporting Agent (Eg. Maintenance Contractor ID or MoT FTE)
- Location - Route # / name and specific Landmark extracted from MoT RIMS corporate data source
- Direction - of route
- Direction and Distance from RIMS landmark reference point
- Event Type (from LOV)
- Number of lanes blocked and lane description
- Expected clearance time
- Actual clearance time

Planned Events – contain the same information as unplanned plus:

- Advance Plan start period
- Expected start date / time
- Expected end date / time
- Closure Type & details (full, part etc)
- Activation Notify period
- Termination Notify period
- Event type details (Eg. Terry Fox run - Movie Production etc.)

Road Conditions:

- Surface type
- Surface condition
- Surface temp (specific areas - where frost probes exist)
- Certain weather data from MoT RWIS system; temp, wind, humidity
- Other weather & forecast data possibly from Environment Canada (to be determined)
- Certain avalanche condition data from MoT SAWS
- Axel weight restriction data from MoT SSLP (default @ 100% of highway rating)

It is proposed that the information from Drive BC system be provided using the ATIS DEN to the gateway. This assumes that the information will be formatted in XML files using ITS standards as specified by the DEN.

4.2 GVA Cities

The cities in the Greater Vancouver Area maintain information on construction and maintenance activities, however there is no consistency in the data recorded and published to the public and in many case the information is not available electronically.

It is proposed that a new system be deployed to allow the cities to enter, view and publish construction, maintenance and road closure information. This data could be made available to the Regional ATIS. This new system could be developed essential from scratch as part of the Regional ATIS or another candidate system could be deployed to meet the requirement.

In identifying potential candidate systems, a base set of requirements for the system would be:

- proven system withy multiple deployments
- manage data from multiple jurisdictions in a single system with security features
- allow entry and viewing of construction, maintenance, closures, incidents, special events using location and maps based on BC Digital Road Atlas
- provide web based data entry and reporting using a thin client (web browser only)
- provide a central data repository for archival and reporting
- publish data using ITS standards including C2C and TMDD
- highly reliable and scalable

A number of jurisdictions have developed their own event management systems as part of an advanced transportation management system. In these cases, the event management function is tightly coupled to the ATMS software and designed according to the jurisdiction's requirements and as such are not easily portable to other jurisdictions.

CARS is a non-proprietary, standards based condition reporting system that allows authorized users to enter, view and disseminate critical road, travel, weather and traffic information. The Condition Acquisition and Reporting System (CARS) is developed and maintained by Castle Rock Consulting on behalf of the member state agencies as a non-proprietary system. It began in 1998 when four states pooled funds for the development of a system that would expedite the reporting of incidents and to allow relevant agencies around the states to share information about the roadway network. Since 1998, it has grown to include ten states (Minnesota, Iowa, Missouri,

Alaska, Washington State, New Mexico, Kentucky, Maine, Vermont, and New Hampshire) and continues to be reviewed, updated and expanded to include more features based on the needs of each state.

CARS users access the system from any location using a standard web browser (ie. no local software is required). This allows users to enter any condition reports or view reports entered by any other CARS users in a jurisdiction.

It is proposed that CARS be deployed as part of the Regional ATIS and to provide for the entry viewing and reporting of events from the GVA cities. CARS will provide event information in the TMDD ERM format.

4.3 Prime (ECOMM)

E-COMM (Emergency Communications for Southwest British Columbia) is responsible for the 911 call service for the entire GVA and for the dispatch of emergency services for the Vancouver and Richmond RCMP. As such, they record incidents that are dispatched to the emergency services. This information could be provided to the Regional ATIS from the Prime Records Management System (RMS).

The implementation of this interface is pending further discussions with Prime.

4.4 BC Ferries

The BC Ferries publishes current sailing time information for the ferry service. This information is published on the BC Ferries web site and is also available in a simple text file with the terminal name and the current sailing times.

The Regional ATIS will request this file periodically through the ATIS gateway and update the information in the database.

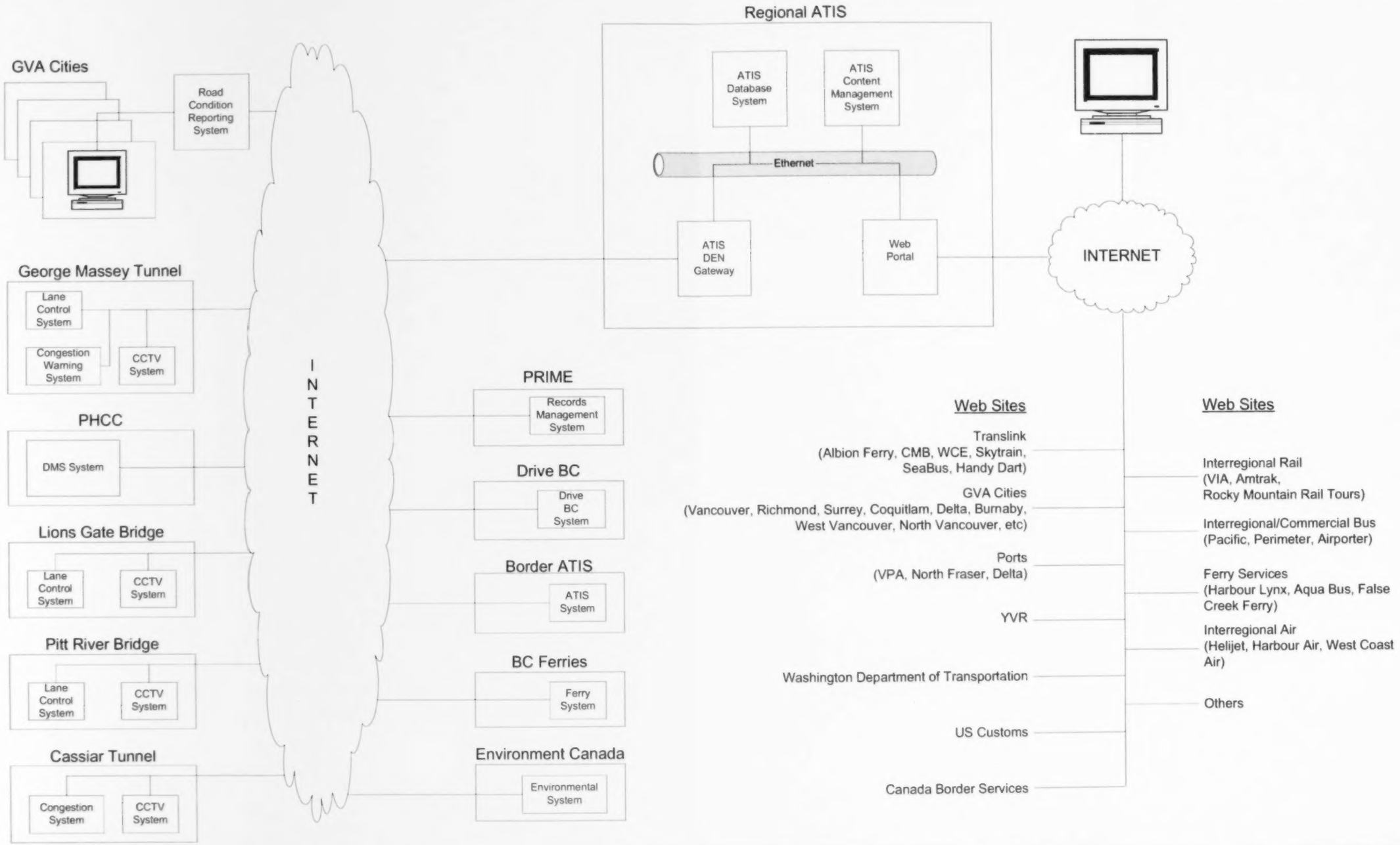
4.5 Environment Canada

Environment Canada – Meteorological Service publishes weather alerts, forecasts, air quality information and provides this information available in a number of formats through the Internet.

The exact format and is pending further discussions with Environment Canada.

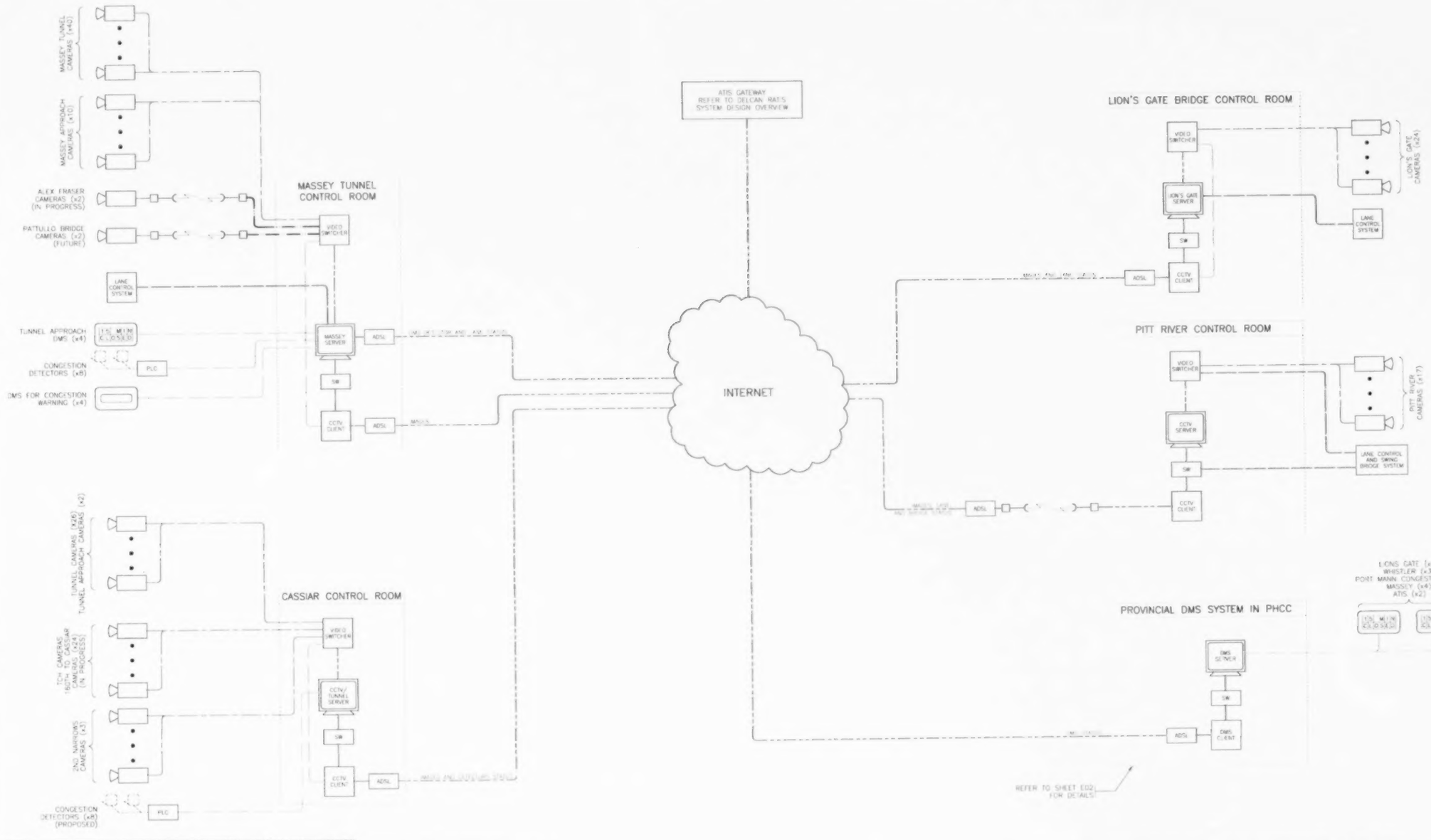
5.0 APPENDIX A – DIAGRAMS

1. System Design – Overview – Phase 1
2. Block Diagram – Connection of MoT Facilities
3. Provincial DMS System



Regional Advanced Traveler Information System
System Design - Overview - Phase 1

Version: 1.3
Date: July 30, 2004



No.	DATE	DESCRIPTION	JAF DRAWN	MD CHK'D	PB DESIGN	CHK'D	APP'D
01	22MAR04	ISSUED FOR RATIS REPORT					

ISSUE / REVISIONS

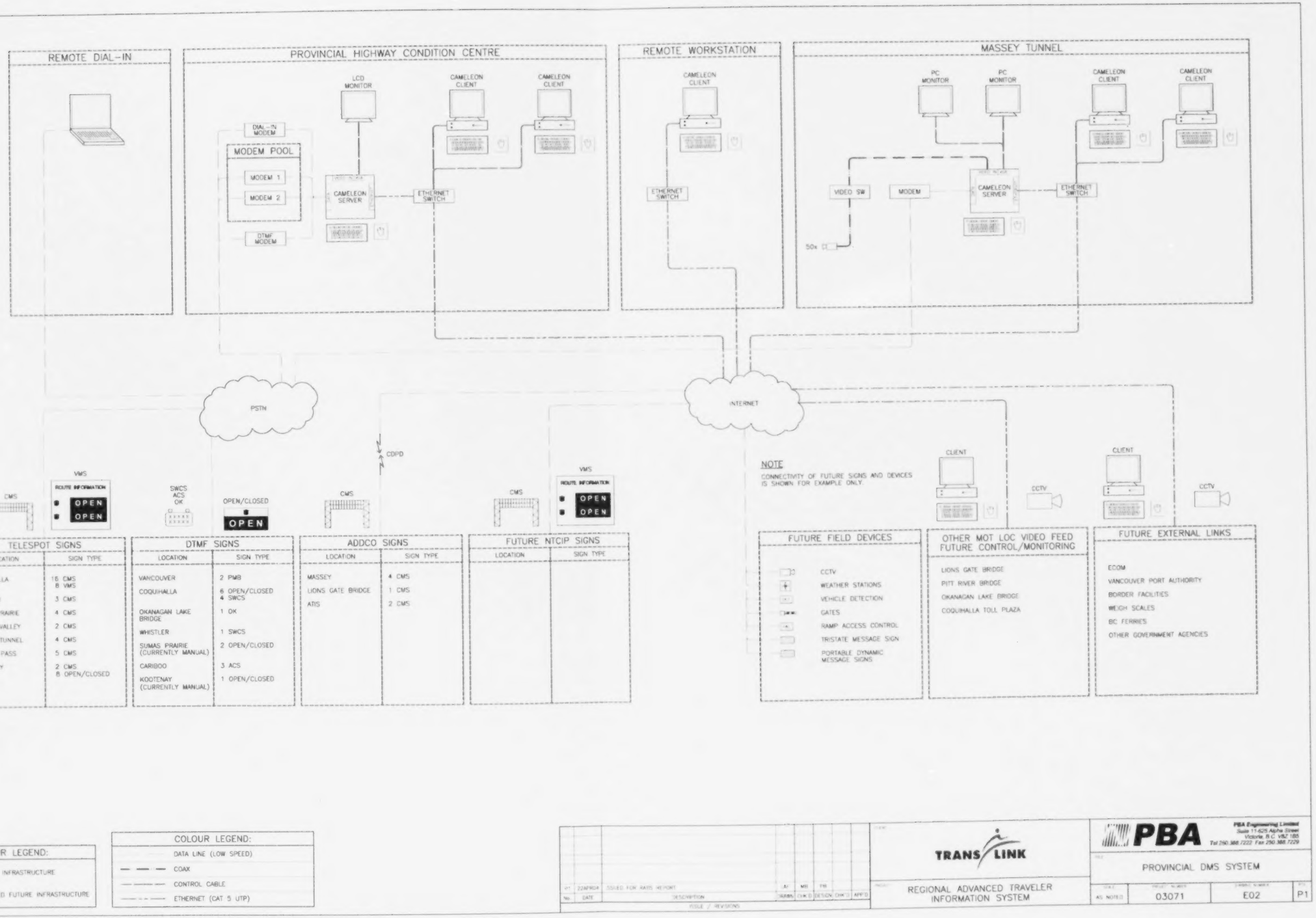
TRANS LINK

REGIONAL ADVANCED TRAVELER INFORMATION SYSTEM

PBA
PBA Engineering Limited
Suite 11-625 Alpha Street
Victoria, B.C. V8Z 1B5
Tel 250.386.7722 Fax 250.386.7229

TITLE: BLOCK DIAGRAM – CONNECTION OF MoT FACILITIES

SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
AS NOTED	03071	E01	P1



NOTE

CONNECTIVITY OF FUTURE SIGNS AND DEVICES IS SHOWN FOR EXAMPLE ONLY.

TELESPOT SIGNS

LOCATION	SIGN TYPE
COQUIHALLA	16 CMS 8 VMS
WHISTLER	3 CMS
SUMAS PRAIRIE	4 CMS
SKEENA VALLEY	2 CMS
MASSEY TUNNEL	4 CMS
ROGERS PASS	5 CMS
KOOTENAY	2 CMS 8 OPEN/CLOSED

DTMF SIGNS

LOCATION	SIGN TYPE
VANCOUVER	2 PMB
COQUIHALLA	6 OPEN/CLOSED 4 SWCS
OKANAGAN LAKE BRIDGE	1 OK
WHISTLER	1 SWCS
SUMAS PRAIRIE (CURRENTLY MANUAL)	2 OPEN/CLOSED
CARIBOO	3 ACS
KOOTENAY (CURRENTLY MANUAL)	1 OPEN/CLOSED

ADDCO SIGNS

LOCATION	SIGN TYPE
MASSEY	4 CMS
LIONS GATE BRIDGE	1 CMS
ATIS	2 CMS

FUTURE NTCIP SIGNS

LOCATION	SIGN TYPE

FUTURE FIELD DEVICES

- CCTV
- WEATHER STATIONS
- VEHICLE DETECTION
- GATES
- RAMP ACCESS CONTROL
- TRISTATE MESSAGE SIGN
- PORTABLE DYNAMIC MESSAGE SIGNS

OTHER MOT LOC VIDEO FEED FUTURE CONTROL/MONITORING

- LIONS GATE BRIDGE
- PITT RIVER BRIDGE
- OKANAGAN LAKE BRIDGE
- COQUIHALLA TOLL PLAZA

FUTURE EXTERNAL LINKS

- ECOM
- VANCOUVER PORT AUTHORITY
- BORDER FACILITIES
- WEIGH SCALES
- BC FERRIES
- OTHER GOVERNMENT AGENCIES

COLOUR LEGEND:

- EXISTING INFRASTRUCTURE
- PROPOSED FUTURE INFRASTRUCTURE

COLOUR LEGEND:

- DATA LINE (LOW SPEED)
- COAX
- CONTROL CABLE
- ETHERNET (CAT 5 UTP)

No.	DATE	DESCRIPTION	BY	MR CHK'D	FB DESGN CHK'D	APP'D
01	22APR04	ISSUED FOR RATIS REPORT	JV	MR	FB	

ISSUE / REVISIONS

TRANS LINK

REGIONAL ADVANCED TRAVELER INFORMATION SYSTEM

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PROVINCIAL DMS SYSTEM

SCALE	PROJECT NUMBER	DRAWING NUMBER	REV
AS NOTED	03071	E02	P1

TRANS LINK

Regional Advanced Traveller Information Systems

APPENDIX V
Web Portal Prototype Description

Final
July 30, 2004

DELCAN

Pangaea

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1 INTRODUCTION

1.1 Project History

The Greater Vancouver Transportation Authority (also known as TransLink) was created in 1999, and is responsible for planning, financing and operating a regional transportation system that moves people and goods efficiently, and supports the regional growth strategy, air quality objectives and economic development of the Greater Vancouver Regional District (GVRD).

Despite a comprehensive network of multi-modal transportation links, the GVRD's transportation system faces many challenges. The ITS Corporation of British Columbia was established, as a subsidiary of the Greater Vancouver Transportation Authority ("TransLink"), to define an ITS program and guide the development and implementation of ITS projects in the region and province.

In November 2001, the Province of British Columbia, with Transport Canada and the ITS Corporation, completed the BC Provincial Intelligent Transportation Systems (ITS) Vision and Strategic Plan for using advanced technologies to help solve provincial, regional and local transportation issues. This plan provides overall directions for the deployment of ITS within the Province of British Columbia by identifying 23 initiatives that provide the steps to achieving the Province's ITS strategies.

As part of the initiative to examine areas of interest to determine the "next step" for joint projects, the ITS Corporation has instigated the development of a concept of operation for a regional advanced traveller information system (ATIS) for Greater Vancouver.

1.2 Purpose of the document

This document presents the description of the web portal prototype for the Advanced Traveller Information System (ATIS). It includes descriptions of the functionality of the web portal system without focusing on technical details.

1.3 Background

Advanced Traveller Information Systems (ATIS) are designed to use advanced systems and technologies to manage information to help drivers decide when to drive and the route to drive, as well as opportunities to reserve rides and other traveller services. The systems make use of information and communication technologies to deliver information to a wide range of Travellers who use different modes of travel and have a wide variety of characteristics. Information enables users to make better travel choices and supports better use of existing transportation facilities. Such systems have the potential to improve the operation of the transportation network and raise the perceived quality of the user's experience through the provision of good usage and option information.

The regional ATIS for Greater Vancouver is one that will gradually develop over time as the availability of information (such as real-time as well as planned transit schedules, incident detection, etc.,) becomes more widely available and dependable. The intention of the project is to develop a concept of operation for a regional ATIS for Greater Vancouver area and demonstrate the feasibility of the system through a first phase implementation.

The project will take advantage of the ITS Corporation's structure to bring together the efforts of many existing regional agencies to create an integrated and unified regional traveller information service. The primary objective of the project is therefore to provide a traveller information system for the Greater Vancouver area that makes use of multiple information delivery systems to provide trip information to the user, when and where it is required, in the appropriate format, and with the appropriate content and timing, to effectively support travel decisions such as choice of mode, choice of route and timing of the trip.

1.4 Goals and Objectives

The vision of the Regional ATIS is to provide the users a "one stop" transportation portal to provide multi-modal, multi-jurisdiction, static as well as real-time traveller information for the Greater Vancouver area via various methods of dissemination.

The objective of the future of ATIS within Greater Vancouver is to provide traveller information to the user, when and where required by deploying multiple information delivery mechanism. The information provided will be in the appropriate format, and with the appropriate content and timing to effectively support travel decisions, such as choice of mode, choice of route, and timing of the journey. The system will also deliver sufficient information to enable hybrid or multimode trip options. The information is to be available at each stage of the trip, namely prior to departure (pre-trip), at departure and during the course of the journey, in a wide variety of customizable formats, including voice synthesized information bulletins, short messages and sophisticated map-type displays.

In summary, the goal is to design a regional ATIS for Greater Vancouver that provides:

- Pre-trip and en-route information that is accurate, timely and reliable;
- Adequate geographical coverage;
- Personalized access & decision guidance;
- Convenient access and speed; and
- Low cost of use (free service).

2 WEB PORTAL

2.1 General Portal Design

Description

The overall portal design will use a News style format and layout, similar to portals currently available on the Internet from Telus (mytelus.com), and many of the country's media outlets (globeandmail.com, Canada.com, canoe.ca).

The portal will combine information that is retrieved from stakeholders through a common look and feel with information available from established web sites and portals to ensure the user does not have to use more than one source for all their traveling information needs.

RATIS - Regional Advanced Transportation Information System - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address http://207.102.240.200/translink/default.asp?Page=Home
About RATIS | Contact | Site Map | Links | Search:
TRANS LINK Regional ATIS
Cameras
Interactive Maps
Trip Planner
RATIS Home
Sections
News & Events
Motorists
Public Transit
Commercial Transportation
Commercial Vehicle Operators
Cycling
Information For
Handicapped Persons
Visitors
Some of the features of this site require the following plug-ins:
FLASH PLAYER
Get Adobe Reader
Welcome
Welcome to the Greater Vancouver Area Regional Advanced Traffic Information System web portal, brought to you by Translink. This portal provides access to information regarding transportation in and around the Greater Vancouver Area, including an interactive map showing current traffic incidents, images from 200 traffic cameras located throughout the region and route and access information for all major modes of transportation, including road, rail, air and marine.
Latest News
Incidents
Major accident at Robson and Granville. Please use alternate routes.
Major accident at Main street and 49th avenue. Please use alternate routes.
Events
HSBC Celebration of Light fireworks will be begin on Wednesday, July 28.
Vancouver Sun Run begins at 9:00AM on Sunday, April 19.
News
Over the next 10 years, TransLink will invest $3.9 billion in transit and roads to maintain or improve travel times for commuters, goods and service providers, cyclists and the disabled community.
TransLink makes getting to and from the Sun Run easier.
Interactive Maps
Traffic Cameras
Current Weather
Forecast
Interactive Maps | Traffic Cameras | Trip Planner | News & Events | Motorists | Public Transit | Commercial Transportation | Commercial Vehicle Operators
Internet

The cornerstone of the Portal will be a feature-rich interactive map that will present numerous layers of information to the traveller. It will allow the user to see current incident and congestion information in a graphical form, and further allow the use of toggle switches to include the road, rail, marine and air travel networks at the same time.

Travellers will also have the ability to view the locations of all traffic, Port and border cameras situated on the same map if they choose. The interactivity of the map will present the user with the ability to customize the view to fit their traveling needs. Finally, the map will be designed to allow the user to zoom into a specific region, and then pan the view of the map across the region, allowing even greater control on what the traveller sees.

The Portal will present information in both general informational pages as well as through the Interactive Map, giving users the ability to find information in more than one way. Further, critical information, including current traffic incidents, will be presented on the Portal Home Page, as well as through additional detail pages elsewhere in the site and the Interactive Map. The detail page information will be presented in a news format that includes a filter to make it easy to exclude information that does not apply to the area the traveller is interested in.

The portal will provide travellers access to an interactive trip-planning tool that is currently available from the main Translink web site.

The Commercial Transit Information section will contain links to display information from the BC Ferries and Vancouver International Airport web sites related to schedules and arrival and departure times and statuses.

2.1.1 Branding/Naming

As of this writing, Translink has still not officially decided on a name or branding scheme for the Portal.

2.1.2 Content

Appendix A includes a full Site Map for the Regional ATIS Portal. As stated above, virtually all content will be available through new-style pages in the Portal as well as the Interactive Map. At a high level the content pages will include the following information:

- Pre-trip Information
- Current traffic conditions
- Current transit/multimodal service conditions
- Transit/Multimodal service schedules and routes
- Parking availability
- En-route Information
- Incidents (type, location, estimated duration, blockage, impact/delay)
- Construction/Maintenance (location, date/time, impact, detours)

- Service Disruptions (type, mode, line/corridor, impact)
- Special Events (date/time, location, special services, closures, recommendations…)
- Border Delays
- Traffic Data/Congestion (locations, volume, occupancy, speed, congestion)
- Road conditions (segment, surface condition)
- CCTV cameras (current image)
- Air Quality/Weather Warnings (current and forecast)

2.1.3 Design Standards

Ease of Use and Performance

The Portal must be intuitive for users regardless of their choice of viewing data through information pages or through the Interactive Map.

Speed is a consideration given the amount of data presented, specifically through the Interactive Map. A key concern is the amount of time is takes to load the map based on the data being loaded to display crashes, congestion, delays, construction, etc. It is not safe to assume that the majority of users will use a high-speed connection to access the Portal.

Traffic volumes are expected to increase over time, especially as new features and information are added to the Portal. Performance must be scalable to accommodate an increase in traffic volume.

The technical tools used to develop the site must be selected with future development in mind. The Portal will evolve over several years as the three phases of the project are completed. The technical tools used to design the site originally should be selected to ensure major re-design efforts are not necessary in the future. Translink supports open standards for development tools. Proprietary technology limits adoption and growth.

Page refresh rates should be monitored for those that update automatically. Page refresh rates should be slower than data refresh rates to ensure the latest information is presented.

Meta tags will be used to ensure the Portal is available to search engines.

Presentation Standards

Contextualization refers to a presentation approach that helps the user understand where they are at any time while navigating the Portal. This is achieved through several means. A breadcrumb trail is a common element of web sites to indicate the page and path the user has followed. Section highlights are another common element, either by focusing on a menu selection (either by bolding it or changing the colour) or by placing a banner at the top of the page. Similarly, the Interactive Map may contain a small window displaying the full view of the map when the user is zoomed into a specific region.

The use of icons, symbols and colour schemes must be consistent throughout the Portal. A number of icons used in the prototype are identified later in this document. Many traffic related sites and portals also take advantage of the public's knowledge and understanding of traffic symbols. Where applicable, this Portal will use traffic symbols and icons as well.

The overall language used in the Portal must be non-technical. This is more of an issue for Translink to be aware of when structuring a team of people to populate the content for the Portal but all project team members must be aware of it. The Portal will be used by a wide cross-section of the population of the Lower Mainland and must not contain terms that may confuse of mislead.

The Portal will take W3C Accessibility Guidelines into consideration when the final design is produced. The guidelines are available at http://www.w3.org/WAI.

2.2 Cameras

Description

Access to over 200 traffic, port and border cameras will be available through the Portal. These cameras are maintained by a number of different stakeholders, from the Ministry of Transportation to the local municipalities to the Port of Vancouver to private businesses. Camera images will be maintained in the database and the Portal will simply retrieve and display the latest image for the camera location selected by the user. New camera images will be added over time; the expectation is that new camera locations and functionality will be included in each of the short-term, medium-term and long-term releases of the Portal.

Links to the camera images will be available from the Cameras page in the Portal as well as the Interactive Map. The Cameras page will include a filter tool that will allow the user to narrow down the list of cameras they wish to view. The filter will include a drop-down list of regions as well as several check-boxes to indicate if they wish to see traffic cameras, port cameras, border cameras or a combination of the three. They will also be able to indicate that they only wish to see a list of cameras that are currently active. This is a feature that will be included in the Portal only when the functionality exists where it is known if a camera is active or not. The filter will include a reset button to clear the current selection criteria and return to the defaults.

Once the user uses the filter to retrieve a list of cameras, that list will be displayed in the page. The list will include the region the camera is in, the location of the camera, the direction it is pointing and the type of camera it is (traffic, port, or border). The list may include more links than can reasonably fit on a page, so the page will be designed to break the list into sections for display purposes. Links will be included to allow the user to navigate the list before selecting the camera image they wish to view.

Each camera in the list will include a hyperlink that leads to a pop-up window that displays the camera image. The window will also display the location of the camera and

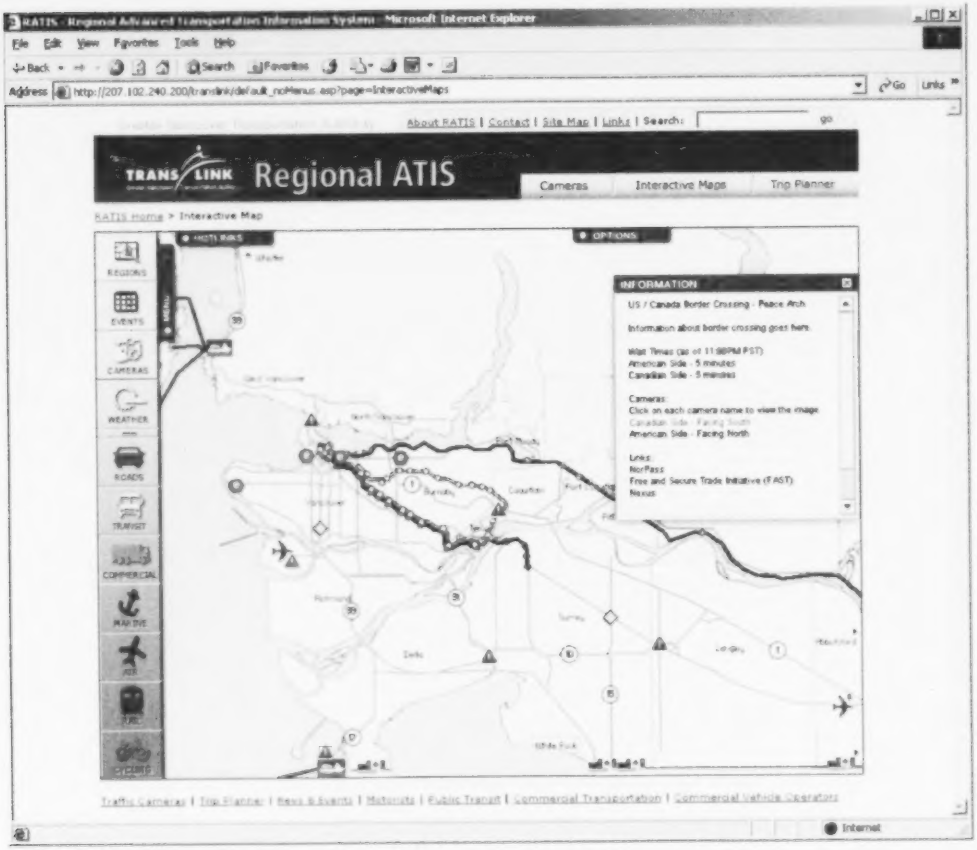
the direction it is pointing and the date and time the image was captured. It will also tell the user how often the image is refreshed.

The Interactive Map will present the location of all cameras in the lower mainland using camera icons. Not all camera locations may be presented at the highest zoom levels, in which case information boxes will be used to consolidate links to several cameras into one list.

2.3 Interactive Map

Description

The map will contain real time and static information, depending on the type of data being shown. The Interactive Map will be based on a grid system, using an X/Y coordinate system to store information about positioning of layer items. It will contain a base map that will always be shown; the map will be a simple outline of the lower mainland region and surrounding areas showing land and water. This map will be vectorized to allow zoom functions to work properly.



The map will have certain layers that can be made visible to show a certain type of information, whether it be municipal borders, provincial highways or Airport locations. The user will be able to turn on the layers that they wish to see, so they can customize the map for there own uses. Layers will consist of one or more images that will represent certain data, such as single image to display the road infrastructure, or multiple images used to represent airport locations. Many of the layer items will be selectable by the users input device (mouse). Selecting a layer item will provide related information in a popup information box.

Some layers will contain too much data to show all the information at a high zoom level. For example, if there are 30 cameras in the downtown Vancouver area, then when the user has the map showing the entire lower mainland, the downtown area will be cluttered with camera icons. To help alleviate this problem some layers will group items at certain levels. The solution is to collect links to more than one camera image in a single camera icon with a corresponding info box.

Some layers will just not show certain icons above a certain zoom level. For example if there is an accident in the Richmond area that really doesn't affect overall traffic flow, this accident will not be shown until the zoom level is low enough.

Functions Required

Navigation

The map will provide the user with the ability to zoom in on any portion of the map. There will be a limit to the level of magnification that the user can zoom to, similar to common mapping functionality currently available on the Internet through mytelus.com or mapquest.com.

Zooming will be accomplished in one of 3 ways. The first is to use the regions menu and select the municipality/region to view. This will be required for some regions, such as Whistler, Abbotsford, Mission or south of the border as they are not shown on the main high level map. The second way to navigate will be through the use of a drag zoom tool. The user will be able to drag a square across the map and zoom in on that square. The third options will be a zoom in tool that when clicked on the map will zoom in on the area clicked. This tool will zoom in at set zoom levels, so the user may slowly zoom in on a specific area. A zoom out tool will also be provided so the user may zoom out at set zoom levels.

The user will also have the ability to pan the map. There are a number of methods to accomplish this. One option is to allow the user to click on the edge of the map to move the view in a specific direction based on where the user clicks. Another option is to provide a centering tool that will refresh the view of the map with the center based on the location the user clicked the mouse on.

Default Layer Information

When the user first enters the Interactive map certain layers will be displayed by default. These include: Municipal Borders, Municipal Names, Provincial Highways, Current Incidents, Border Information, BC Ferries, and International Airports.

Menus

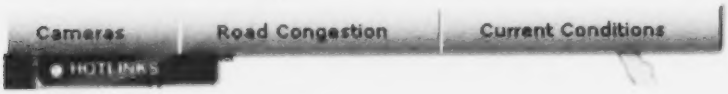
The interactive map will have multiple menus containing the map functionality. There are two distinct types of menus, main menus and fly-out menus. There are four main menus, the Layers menu, the Hotlinks Menu, the Options menu and the Tools Menu. These menus are attached to the edge of the map and contain buttons that either lead to fly-out menus or to primary functions, such as the ability to save your settings. Fly-out menus contain layer choices and are used to control the layers displayed on the map. Each menu will have the ability to be opened and closed and, in the case of fly-out menus, be dragged to a different location on the map in case the menu is blocking some map information.

Layers Menu

All the available layers will be found in one menu. The layer will be organized into logical groupings, with some layer items being found in multiple groups (i.e. BC Ferries will be found in transit, commercial and marine). See the specific layer section for a list of all the available layers

Hotlinks Menu

The Hotlinks menu will provide groupings of important and frequently used layers. This will allow the user to easily turn on multiple layers with a single click. The 3 hotlinks options are Cameras, Road Congestion and Current Conditions.



Cameras

The Cameras hotlink button will turn all cameras layers, which includes traffic cameras, port cameras and border cameras.

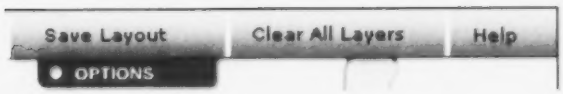
Road Congestion

The Road Congestion hotlink button will turn on the Congestion layer.

Current Conditions

The Current Conditions hotlink button will turn all the Incidents, Construction and Border Information layers.

Options Menu



Save

Functionality will be provided to save the current layout, so that when the user exits and renters the interactive map their layer setting will be saved. The user will have the ability to reset the layers to the default layout.

Clear

This will allow the user to clear all the current displayed layers.

Help

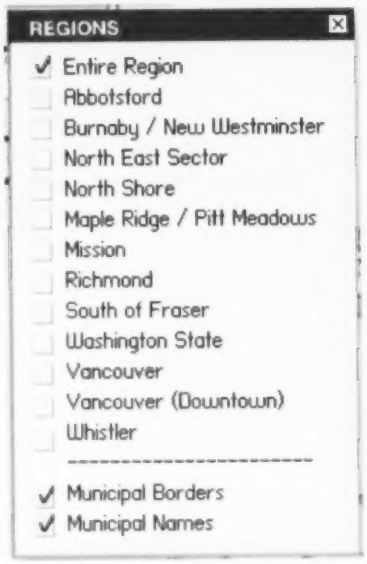
A full help system will need to be available for the user. This will contain any information needed by the user to properly use the Interactive Map.

Tools Menu

The tools menu will contain all navigation tools used with the map. These include and Zoom in tool, a Zoom out tool, a centering tool, and a drag zoom tool. Note that the Tools Menu was not built as part of the Portal prototype.

Layers Menu Details

This section presents the contents of each fly-out menu that is presented when the user makes a selection from the Layers Menu.



Regions

The Regions menu will allow the user to quickly zoom in on a specific region without having to use the navigation tools. It will also allow user to zoom in on areas not shown on the high level map such as Whistler, Abbotsford, Mission or south of the Canada/U.S.A. border. This feature will be useful for users who may not be familiar with the lower mainland geography, and may not know the exact location of specific municipalities/regions.

Also included in this menu are options to display the municipal borders and municipal names of the cities that make up the lower mainland.

Events

The Events menu contains layers that display Traffic Incidents, Construction and Events that may lead to traffic congestion. Layers exist for these three selections that display current information. Layers also exist for know future construction, events and service disruptions. For example, travellers may wish to know which streets and marine areas will be blocked when the Vancouver Celebration of Light Fireworks event takes place on English Bay.

Incidents include vehicle crashes and rail, air and marine accidents. They are indicated on the map by a red triangle icon (▲). Construction is indicated by an orange/yellow diamond icon (◇) and events are indicated by a green circle icon (●).

Cameras

The cameras layers will display show the locations of web enabled cameras in the region. Cameras are broken down into three types: traffic cameras, port cameras and border cameras. Selecting a camera will open an information box containing the location of the cameras and provide links to each camera image.

Depending on the final design of the map, the total number of cameras will preclude providing an individual icon and link on the map for each camera location. Information boxes will be used to present a list of cameras in a specific area of the map with individual links available from the list.

Weather

The weather layer will include all weather sampling points that are provided by Environment Canada. Selecting a weather location will provide all available weather information available for that location presented in an information box.

Roads

The Roads menu will include layers that display information specific to the roads and highways in the lower mainland. In addition to several map layers, users will have access to parking information and highway message sign information. This menu includes links available elsewhere in the Interactive Map, including the Albion Ferry and Incident information.

Provincial Highways

This layer will show the major Provincial highways, including Highway 1, 99, 17, 91, 10 and 15.

Major Corridors

This layer will show all major corridors in the lower mainland, including but not limited to, all highways included in the Provincial Highways layer, highway 7, King George Highway, Oak, Granville and Hastings streets, Barnet Highway, Fraser Highway, Kingsway, Broadway and Marine Drive.

Arterial Roads

The Arterial Roads layer will show all roads. Given the level of detail, some roads may not be shown at certain zoom levels, similar to the common mapping web sites available on the Internet today.

Border Information

The layer will display icons at all border crossings. Each border crossing will include information about border wait times, border cameras, and links to relevant systems such as NorPass, FAST, Nexus, SENTRI and any other links that will be useful for individuals and commercial vehicles crossing into or out of Canada.

Albion Ferry

This layer will display an icon for the Albion Ferry crossing. Clicking the icon will present and information box including information about the Albion Ferry, and current wait times.

Parking Locations

The Parking Locations layer will display various parking locations, including Park & Ride locations and private parking locations. In the future this may include real time information about current lot status and show the total number of available parking spots.

Highway Message Signs

This layer will display the locations of Highway message signs and their current message.

Congestion

The Congestion layer will display real time information about road congestion on major routes. This layer is planned for a future release of the Portal, depending on the installation of congestion monitoring equipment. Congestion will be displayed using a colour coded system where red, yellow and green are used to represent the flow of traffic similar to colours used on traffic intersection lights. At the time this layer is implemented additional colours may be introduced to provide an additional level of detail, including sections of the road where there is no reading or no equipment.

Current Incidents – See Events section above

Current Construction – See Events section above

Current Events – See Events section above

Transit

The Transit menu provides layers that display information for all public and private modes of transit available in the lower mainland.

Public Bus Routes

This layer will display all public bus routes. Bus routes will be selectable to provide route/timing information in information boxes.

B-Lines

A separate layer will be provided to display the B-Line routes. B-Line routes will be selectable, and will provide route & schedule/timing information in information boxes.

West Vancouver Blue Bus

This layer will display the West Vancouver Blue Bus routes. Routes will be selectable, and will provide route & schedule/timing information in information boxes.

Transit Exchanges

This layer will display the locations of major transit exchanges. Exchanges will be selectable, presenting an information box that will provide exchange details, including all buses that use the exchange, and links to maps of the exchanges.

Sea Bus

This layer will display the Sea bus route and stations. The route will be selectable, presenting an information box with details regarding the Sea Bus and stations.

Sky Train

The Sky Train layer will display the Sky Train route and stations. Each route and station will be selectable, providing information about any current delays as well as details about each station.

West Coast Express

This layer will display the West Coast Express route and stations. The route and stations will be selectable, providing information about any current delays as well as details about each station.

Parking Locations - See Roads

Greyhound and Other Buses

This layer will show the locations of private bus companies or bus terminals which when selected will provide links to bus companies in an information box.

BC Ferries

The BC Ferries layer will display icons representing the BC Ferry terminals which when selected will display current operating conditions and links to BC Ferries information in an information box.

International Airports

This layer will display icons representing the International Airport locations (YVR, YXX), which when selected will provide airport information and links to airport websites in an information box. They will also include direct links to the Arrival and Departure web pages maintained by the airports themselves.

Regional Airports

This layer displays icons representing each Regional Airport location (Boundary Bay, Pitt Meadows, Langley), which when selected will provide airport information and links to airport websites in an information box.

Amtrak

The Amtrak layer will show the location of the Amtrak station location. An information box will provide information and links.

VIA Rail

The VIA Rail layer will show the location of the VIA Rail station. An information box will provide information and links.

Commercial

The Commercial menu provides layers that present information in the Interactive Map that is relevant to commercial carriers, including the trucking industry, and commercial rail, marine and air transportation.

Border Information – See Roads

Weigh Scales

This layer will show all weigh scale locations. When the user clicks a weigh scale icon an information box will be presented with information relevant to that weigh scale location.

Trucking Routes

This layer will simply present the trucking routes in the lower mainland. The route may be made selectable to present an information box that lists restrictions for the route and other pertinent information.

Dangerous Goods Routes

This layer will show Dangerous good route and when selected will give links to dangerous goods information.

BC Ferries – See Transit

International Airports – See Transit

Regional Airports – See Transit

Marine

The Marine menu presents layers that display information relevant to marine traffic in the lower mainland.

Albion Ferry – See Roads

Sea Bus – See Transit

BC Ferries – See Transit

Cruise Lines Info

The Cruise Lines Info layer will display icons for each cruise ship terminal location. When the icon is selected an information box will display links to cruise ship schedules and information.

False Creek Ferries

This layer will provide False Creek Ferries terminals and routes. An information box will present links to False Creek Ferries information.

Harbour Lynx

This layer will provide the location of the Harbour Lynx terminal and when selected will provided links to Harbour Lynx information.

Ports

The Ports layer will present icons indicating the location of each major port from the Vancouver Port Authority, North Fraser Port Authority, Fraser Port Authority and Steveston Port Authority. Clicking one of the Port icons will present an information box that includes relevant information, cameras links, and web page links for the selected Port.

Customs Entry Points

This layer will present the locations of all Marine Customs offices. Selecting an icon will provide information and links in an information box.

Marine Access Points

This layer will show the location of each road access point to the various Ports in the lower mainland. This will provide truck drivers unfamiliar with the lower mainland information on how to reach the Port to either deliver or pick up a shipment. Information boxes will be available from each icon to list the address of each point of access as well as other relevant information.

Air

International Airports – See Transit

Regional Airports – See Transit

Harbour Air

This layer will show Harbour Air locations and when selected will provide information and links.

Helijet

This layer will show Helijet locations and when selected will provide information and links.

Rail

Sky Train – See Transit

West Coast Express – See Transit

Amtrak – See Transit

Rocky Mountaineer

This layer will show Rocky Mountaineer locations and when selected will provide information and links.

VIA Rail – See Transit

Rail Access Points

This layer will show all access points for rail travel as well as commercial good transfer.

Cycling

Cycling Paths

This layer will show all cycling routes in the lower mainland. Selected routes may be activated to display information boxes with information about the route.

APPENDIX A WEB PORTAL SITE MAP

Legend:
[M] = Medium Term content.
[L] = Long Term content.

Home Page

The home page is presented as a "news" portal, with listings of links down the left column, and important incidents, events, news, weather, etc. in the body. Any links of particular importance are highlighted here (such as the interactive map, trip planner application or web cameras).

The left hand navigation will be broken into modes of transportation with sub menus under each mode. A fly out menu system will be used to help minimize the number of user clicks needed to access various pages.

1. Events and News

   This section displays all noteworthy incidents, events and news. Highlights of major incidents, events and news from it are displayed on the home page of the site, with this section acting as overflow. It uses information from most other areas of the site. This section will need the ability to be filtered by region, type and possibly other criteria. All information will be displayed in small briefs (headlines?) with links to the full information. Icons will be used to indicate the nature of the incident or news. For example, all incidents will use a common icon, events such as the Fireworks or a parade will use a similar icon, demonstrations or marches that close streets will use a common icon and then there will be an icon to indicate news by mode, be it rail, marine, air or traffic.

1.1 Traveller alerts
1.2 Incidents
1.3 Border delays
1.4 Transit service disruptions
1.5 Special events

2. (Multimodal) Trip Planner [L]

   For the short range this will use TransLink's trip planner. Down the road it will integrate other forms of transportation. Details as to whether they will be separate applications or one more robust application are yet to be determined.

3. Interactive Maps (application)

   The map application is the main feature of the site. The following functionality assumes that a system based on Macromedia Flash v7 is being used.

It will launch in the main portion of the HTML container page, starting up with an overall area view. Clicking on region of the map will zoom in on that particular region. Similarly, users will have the ability to select a specific area of the map to zoom in on, and have the ability to pan the map as required.

The map will have various layers that can be toggled on/off. The layer will represent various types of information such as road congestion, camera locations, transit routes, or major transit access points. All the layers available will be listed below through the use of standard icons. Certain layers will contain link icons, which when clicked will provide a popup window with appropriate data associated with the link. For example, an incident, such as construction, will be displayed on the map as a standard incident icon, and when clicked will popup a window displaying the incident description and any other related information. Another example is when the user clicks on the BC Ferries icon at the Tsawwassen terminal, a popup window will display with links to specific ferries information at the BC Ferries web site.

4. Web Cameras

Various Web Cameras will be available to display on the ATIS website. The cameras will be accessible from the Interactive map as well as from a text listing. The text listing will allow the user to filter the list of cameras by region and type (port, traffic, border etc...)

Website Sections

The following sections list all the available data accessible on the web site. Some of the information below will not be available from the interactive map application. The sections below will be accessible from the side menu on the website.

5. Motorists

- 5.1 Road Information
  - 5.1.1 Camera listings/ images [M][L]
  - 5.1.2 Road construction / Road maintenance [M]
  - 5.1.3 Special Events [M]
  - 5.1.4 Road Closures [M]
  - 5.1.5 Map (link to Interactive Map)
- 5.2 Drive BC ATIS
  - 5.2.1 Road Conditions
  - 5.2.2 Incidents
  - 5.2.3 Road Weather
  - 5.2.4 Road Closures
  - 5.2.5 (Link to external site)
- 5.3 Highways
  - 5.3.1 Coquihala Hwy 5
    - 5.3.1.1 Camera images

5.3.1.2 Map (link to Interactive Map)
5.3.2 Hwy 1 (Trans Canada)
5.3.2.1 Camera images
5.3.2.2 Map (link to Interactive Map)
5.3.3 Whistler Hwy 99
5.3.3.1 Camera images
5.3.3.2 Map (link to Interactive Map)
5.3.4 Hwy 10 [M]
5.3.4.1 Camera images [M]
5.3.4.2 Map (link to Interactive Map)
5.3.5 Hwy 17 [M]
5.3.5.1 Map (link to Interactive Map)
5.3.5.2 Camera images [M]
5.4 Border Crossings
5.4.1 Canadian Side
5.4.1.1 Border delays/times
5.4.1.2 Cameras
5.4.2 American Side border delays/times
5.4.3 Map (link to Interactive Map)
5.5 Bridges and Tunnels
5.5.1 Lion's Gate Bridge
5.5.1.1 Lane status [M]
5.5.1.2 Traffic speed, volume & occupancy [M]
5.5.1.3 Cameras
5.5.1.4 Map (link to Interactive Map)
5.5.2 Pitt River
5.5.2.1 Lane status
5.5.2.2 Status of swing bridge
5.5.2.3 Cameras
5.5.2.4 Map (link to Interactive Map)
5.5.3 Massey Tunnel
5.5.3.1 Lane status
5.5.3 2 Traffic speed, volume & occupancy
5.5.3.3 Cameras
5.5.3.4 Map (link to Interactive Map)
5.5.4 Cassiar Tunnel/Second Narrows Bridge
5.5.4.1 Congestion data [M]
5.5.4.2 Cameras
5.5.4.3 Map (link to Interactive Map)

6. Public Transit

6.1 General Information
6.1.1 General information about public transportation in the region
6.1.2 Fares and Zones
6.1.3 Park and Ride [M]
6.1.3.1 Parking Locations and Rates

- 6.1.3.2 Real-time Parking Information [L]
- 6.1.3.3 Parking Management System (book a parking space) [L]
- 6.1.4 Parking Information [M]
  - 6.1.4.1 Parking Locations and Rates
  - 6.1.4.2 Real-time Parking Information [L]
  - 6.1.4.3 Parking Management System (book a parking space) [L]
- 6.2 Buses
  - 6.2.1 Transit routes
  - 6.2.2 Schedules and fares
  - 6.2.3 Service Disruptions [M]
  - 6.2.4 West Van BlueBus
    - 6.2.4.1 Routes
    - 6.2.4.2 Schedules and fares
    - 6.2.4.3 Service Disruptions [M]
  - 6.2.5 HandyDART [M]
    - 6.2.5.1 Real-time vehicle locations
- 6.3 Rail
  - 6.3.1 SkyTrain
    - 6.3.1.1 Routes
    - 6.3.1.2 Schedules and fares
    - 6.3.1.3 Service Disruptions [M]
  - 6.3.2 West Coast Express
    - 6.3.2.1 Routes
    - 6.3.2.2 Schedules and fares
    - 6.3.2.3 Service Disruptions [M]
- 6.4 Marine
  - 6.4.1 Seabus
    - 6.4.1.1 Routes
    - 6.4.1.2 Schedules and fares
    - 6.4.1.3 Service Disruptions [M]
  - 6.4.2 Albion Ferry
    - 6.4.2.1 Routes, Schedules
    - 6.4.2.2 Crossing Wait Times [M]

7. Commercial Transit

- 7.1 General Information
  - 7.1.1 General information about commercial transportation in the region
- 7.2 Buses
  - 7.2.1 Bus Stations (Access Points) [M]
  - 7.2.2 Pacific Coach Lines [M]
    - 7.2.2.1 Routes, Schedules and Fares
    - 7.2.2.2 Service Disruptions
  - 7.2.3 Perimeter [M]
    - 7.2.3.1 Routes, Schedules and Fares
    - 7.2.3.2 Service Disruptions
  - 7.2.4 Trolley Bus [L]

- 7.2.4.1 Routes, Schedules and Fares
- 7.2.4.2 Service Disruptions

7.3 Air

- 7.3.1 Airports / Airlines
  - 7.3.1.1 Traffic Information
  - 7.3.1.2 Air Flight Schedules
  - 7.3.1.3 Real-time Flight Information (with flight notification)
  - 7.3.1.4 Traffic Information
  - 7.3.1.5 Road Incidents, Closures, Congestion [M]
  - 7.3.1.6 Parking Information [M]
  - 7.3.1.7 Parking Locations and Rates [M]
  - 7.3.1.8 Real-time Parking Information [L]
  - 7.3.1.9 Parking Management System (book a parking space) [L]
- 7.3.2 Airporter [M]
  - 7.3.2.1 Routes, Schedules and Fares
  - 7.3.2.2 Service Disruptions
- 7.3.3 Helijet
  - 7.3.3.1 Routes, Schedules and Fares
  - 7.3.3.2 Service Disruptions [M]
- 7.3.4 Harbour Air Seaplanes
  - 7.3.4.1 Routes, Schedules and Fares
  - 7.3.4.2 Service Disruptions [M]

7.4 Rail

- 7.4.1 Rail Stations
- 7.4.2 VIA Rail
  - 7.4.2.1 Routes and Schedules
  - 7.4.2.2 Online planner and Booking (external link)
  - 7.4.2.3 Parking Locations and Rates [M]
  - 7.4.2.4 Real-time Parking Information [L]
  - 7.4.2.5 Parking Management System (book a parking space) [L]
- 7.4.3 Amtrak
  - 7.4.3.1 Routes and Schedules
- 7.4.4 Rocky Mountain Rail Tours
  - 7.4.4.1 Routes, Schedules and Fares
  - 7.4.4.2 Service Disruptions [M]

7.5 Marine

- 7.5.1 BC Ferries
  - 7.5.1.1 Ferry Schedules
  - 7.5.1.2 Real-time Ferry Departure, wait times
  - 7.5.1.3 Service Notifications
  - 7.5.1.4 Parking Locations and Rates [M]
  - 7.5.1.5 Real-time Parking Information [L]
  - 7.5.1.6 Parking Management System (book a parking space) [L]
- 7.5.2 Aqua Bus / False Creek Ferries
  - 7.5.2.1 Routes, Schedules and Fares
- 7.5.3 Harbour Lynx
  - 7.5.3.1 Routes, Schedules and Fares

- 7.5.4 Cruises / Boating
  - 7.5.4.1 Annual Cruise Schedules
  - 7.5.4.2 Traffic Cameras

8. Commercial Vehicle Operators

This section holds specific information for commercial operators. Most of what they need will be found with the regular traffic information but specific links and requirements can be found here.

- 8.1 General Information
  - 8.1.1 Possible Dangerous Goods Routes?
  - 8.1.2 Operator Information
  - 8.1.3 Links to resources (intermodal points, BC Trucking, FAST, NEXUS, US Homeland Security, Weigh in Motion Information, ICBC safety information, CCMTA, WIM stations)
  - 8.1.4 Weigh Scales
  - 8.1.5 Height & Weight Restrictions
- 8.2 Air
  - 8.2.1 Airports / Airlines
    - 8.2.1.1 Traffic Information
    - 8.2.1.2 Air Flight Schedules
    - 8.2.1.3 Real-time Flight Information (with flight notification)
    - 8.2.1.4 Road Incidents, Closures, Congestion [M]
- 8.3 Rail
  - 8.3.1 Access Points
- 8.4 Marine
  - 8.4.1 Vancouver Port Authority
    - 8.4.1.1 Camera images
    - 8.4.1.2 Map (link to Interactive Map)
    - 8.4.1.3 Access Points
  - 8.4.2 Fraser Port Authority
    - 8.4.2.1 Access Points
  - 8.4.3 North Fraser Port Authority
    - 8.4.3.1 Access Points
  - 8.4.4 Steveston Harbour Authority
    - 8.4.4.1 Access Points

9. Cycling [M]

- 9.1 Cycling Route Maps
- 9.2 Bikes and Public Transit (link to TransLink)
- 9.3 Secure Racks and Lockers (link to TransLink)
- 9.4 Cyclist Resources (links to additional information)

10. Air and Weather

Air and Weather will be displayed on the home page of the ATIS website. Only basic information will displayed (perhaps only an icon displaying general conditions) with a link to more information.

- 10.1 Air Quality/Conditions
- 10.2 Weather Conditions
  - 10.2.1 Weather Forecast
  - 10.2.2 Weather Warnings
  - 10.2.3 Radar Maps

11. For Handicapped Persons

This area gives overall information for handicapped persons. In addition, handicapped specific information will be found in the relevant areas (such as SkyTrain accessibility) with some sort of highlight, such as the handicapped parking symbol.

- 11.1 Resources for Handicapped Persons (additional links)

12. Visitor Resources

This section is for people new to the area or traveling through. It will be closely tied in to the public information kiosks.

- 12.1 Tourist Information
- 12.2 Travel Services (links – Yellow Pages?)

13. Site Tools

This is a grouping of links that appear on every page.

- 13.1 About RATIS
  - 13.1.1 Partners (info and links)
  - 13.1.2 Using This Site
  - 13.1.3 Contact
- 13.2 Feedback
- 13.3 Site Map
- 13.4 Links
- 13.5 Search